USDA United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with Maryland Agricultural Experiment Station (University of Maryland), Queen Anne's County Commissioners, Queen Anne Soil Conservation District, and Maryland Department of Agriculture

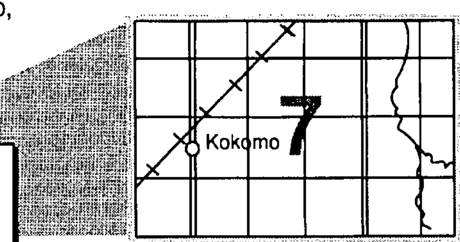
Soil Survey of Queen Anne's County, Maryland

How to Use This Soil Survey

General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

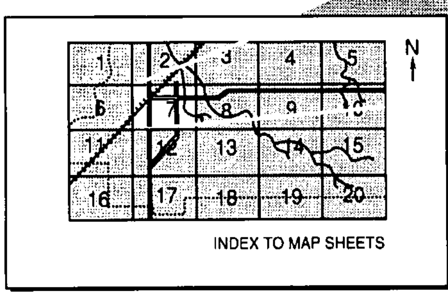
To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.



MAP SHEET

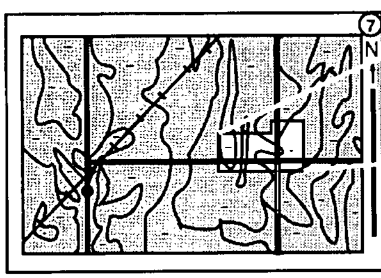
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

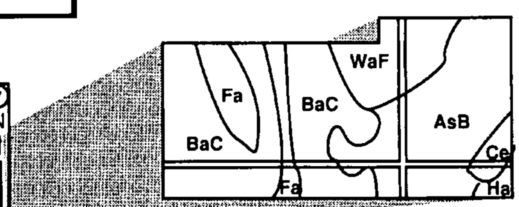


INDEX TO MAP SHEETS

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet and turn to that sheet.



MAP SHEET



AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

Locate your area of interest on the map sheet. Note the map units symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1994. Soil names and descriptions were approved in 1995. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1994. This soil survey was made cooperatively by the Natural Resources Conservation Service, the Maryland Agricultural Experiment Station (University of Maryland), the Queen Anne's County Commissioners, the Queen Anne Soil Conservation District, and the Maryland Department of Agriculture. Partial funding of the survey was provided by Queen Anne's County. The survey is part of the technical assistance furnished to the Queen Anne Soil Conservation District.

Cover: Statue of Queen Anne at Queen Anne's County Courthouse in Centreville. This courthouse is the oldest courthouse in Maryland that is still in use.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is http://www.nrcs.usda.gov (click on "Technical Resources").

Contents

Issued 2002

Foreword

This soil survey contains information that affects land use planning in Queen Anne's County. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various decisions for land use or land treatment. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

David P. Doss
State Conservationist
Natural Resources Conservation Service

Soil Survey of
Queen Anne's County, Maryland

Updated and revised by Diane A. Shields and Susan L. Davis,
Natural Resources Conservation Service

Original survey by Earle D. Matthews and William U. Reybold, III,
Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service,
in cooperation with
Maryland Agricultural Experiment Station (University of Maryland),
Queen Anne's County Commissioners, Queen Anne Soil Conservation District,
and Maryland Department of Agriculture

QUEEN ANNE'S COUNTY is in the north-central part of Maryland's Eastern shore (fig. 1). The county is on the western edge of the Delmarva Peninsula that extends between the Atlantic Ocean and Chesapeake Bay. The county has a total area of 238,000 acres, or 372 square miles. Centreville, the county seat, is near the center of the county, at the headwaters of the Corsica River. It is approximately 30 miles from Annapolis and 60 miles from Washington, D.C. According to the 1990 census, the population of Queen Anne's County is 33,953, an increase of 105 percent since 1960.

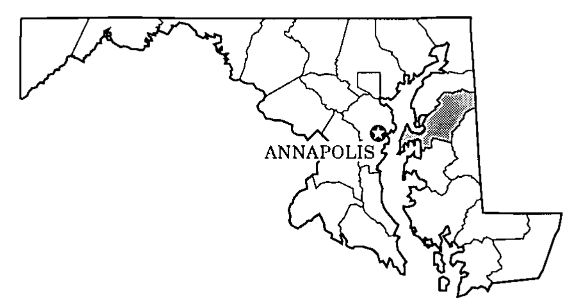


Figure 1.—Location of Queen Anne's County in Maryland.

Farming is the main land use in Queen Anne's County. The sources of farm income are mainly field crops, such as soybeans, small grain, and corn, but include vegetable crops, poultry, and dairy and forest products. Land rental for hunting is a common source of income from the land. Other nonfarm sources of employment include commercial fishing and other water-related industries, retail and wholesale trade, small manufacturers, service industries, tourism, and recreation.

The soils in the county range widely in texture, natural drainage, and other characteristics. The southwestern part of Queen Anne's County, which includes the Kent Island/Grasonville area, is made up of nearly level lowland flats that are characterized by windblown materials overlying alluvial and marine sediments. Most of the tidal marshes are in this part of the county, and many of the upland soils have seasonal high water tables near the surface. The central part of the county is nearly level to strongly sloping with dominantly alluvial sediments and well drained soils. Along the Chester River terrace, the soils are sandy and, in some areas, excessively drained. The landscape in the northeastern portion of the county, along the Caroline County line and the Delaware State line, is dominated by closed circular depressions known as potholes, whale wallows, or Delmarva bays. The soils are poorly drained or very poorly drained, and many manmade ditches dissect the cropland.

This soil survey updates the survey of Queen Anne's County published in 1966 *(30)*. It provides

additional information and has larger maps, which show the soils in greater detail.

General Nature of the Survey Area

This section gives general information about Queen Anne's County. It describes the history and development; industry and transportation; physiography, relief, and drainage; water supply; agriculture; natural resources; and climate.

History and Development

Queen Anne's County was established in 1706 and named for Queen Anne of England. The population of the county was 15,463 in 1790; 16,569 in 1960; and 33,953 in 1990 *(7)*. The original inhabitants in the survey area were Native Americans of several tribes, including the Ozinies along the Chester River, the Matapeakes on Kent Island, and the Tockwoghs at the northern end of the survey area *(7)*.

The first English settlement was established on Kent Island in 1631 by William Claiborne of Virginia. The mainland parts of the county were settled by the late 1650's. These settlements were located primarily along the water or near areas with access to the water for transportation. The English colonists learned to grow tobacco from the Native Americans of Virginia, and tobacco soon became a staple crop in Queen Anne's County. During the Revolutionary War, the tobacco planters were cut off from the English markets and grew wheat and corn instead. The soils in the survey area proved to be very productive for cereal crops, so corn and wheat remained staple crops. Orchard products and tomatoes, along with dairy and poultry products, later became additional sources of farm income *(7)*.

Industry and Transportation

Retail and wholesale trade industries and service industries related to tourism and recreation account for a large portion of the commerce in Queen Anne's County. Farming and agricultural services and other industries related to natural resources, including commercial fishing, forestry, and horticulture, are important to the county's economy. A number of light manufacturing plants produce marine valves and couplings, sails, plastic and nylon products, truck trailers, doors and windows, and custom guitars and perform mailing and commercial printing services.

A system of state and county roads serves all parts of the county. The main highways in the county are U.S. Routes 50 and 301, which cross Chesapeake Bay as one highway via the William Preston Lane, Jr., Bridge. The highways split at Queenstown, and Route 50 runs south to Easton and Route 301 runs north. The other major roads are Maryland Routes 213, 313, and 302. Eleven motor freight common carriers serve the county. A single-track railroad spur of the Maryland and Delaware Railroad runs from Centreville to Millington. The Port of Baltimore, with a 50-foot channel, is 49 miles from Centreville. Many pleasure and work boats use the waterways and harbors (fig. 2). The Bay Bridge Airport, a small commercial airport, is located near Chesapeake Bay at Route 50/301. Other aviation services are also available.

Physiography, Relief, and Drainage

Queen Anne's County is within the Mid-Atlantic Coastal Plain physiographic region. Beneath the surface of the county lies a wedge-shaped mass of sediments, approximately 2,500 feet thick at Kent Island, that consists of unconsolidated sediments—sands, silts, clays, and gravel *(14)*. The sediments were deposited primarily in marine, shallow water, or fluvial environments. Underlying these sediments is Precambrian crystalline rock (gneiss or gneiss and schist) that dips to the southeast *(12)*. A thin layer of windblown silts covers the land surface, primarily in the western part of the county. The windblown deposits may have been reworked by streams and moving water in some areas.

The relief of the county is generally slight. The highest point, located in the vicinity of Starr, is 87 feet above sea level. The lowest parts of the county are the tidal marshes, which are at or just above sea level.

The county can be divided into two major topographic regions: the Talbot Terrace or Plain, at elevations between 0 and 40 feet above sea level, and the Wicomico Plain, at elevations between 40 and 90 feet *(17)*. These two major regions were formed by different stands of sea level when Chesapeake Bay was much higher than it is today.

The Talbot Terrace is in the western part of the survey area, along Chesapeake Bay and the Chester River. It consists of broad, level flats dissected by tidal streams. The surface is composed of loess or alluvial materials overlying the Kent Island Formation. The loess consists of windblown silt that was removed from the flood plain of the ancient Susquehanna River, which is presently the basin of Chesapeake Bay *(11)*. The soils generally are poorly drained to moderately well drained. Wave-cut cliffs are common along the higher peninsulas, or necks, extending into Chesapeake Bay and the Chester River.

The tidal marshes occurring along Chesapeake Bay

Figure 2.—Fishing boats in Thompson Creek.

and the tidal rivers are generally inundated during high tides. The tidal marsh soils formed in the accumulated organic matter and mineral sediments of variable texture and are very poorly drained. Tidal marshes on the tips of low-lying peninsulas were formerly upland soils which have been submerged by rising sea levels that resulted from the melting of the most recent ice sheet. Gradual inundation with brackish water has allowed the accumulation of organic residues on top of previously developed upland soils *(6)*.

A low escarpment, which runs north to south through the county from Rolph's Wharf to Wye Narrows and is at elevations between 20 and 60 feet, divides the Talbot Terrace from the Wicomico Plain. This escarpment marks the east shore of an ancestral Chesapeake Bay *(22)*.

The uplands east of the escarpment are part of the Wicomico Plain, underlain by the Pensauken Formation. These sediments are the oldest in Queen Anne's County. Most of the Wicomico Plain is a gently undulating plain that is well dissected by mature streams and dominantly has well drained soils. The northeastern part, however, forms the divide between the Chester River and Choptank River watersheds. It is very flat, has little natural drainage, and is dominantly between 60 and 75 feet in elevation. It is characterized by many closed circular or elliptical depressions surrounded by sandy rims which are known as potholes, whale wallows, or Delmarva bays. These whale wallows occur throughout the Pensauken Formation but are concentrated in this part of Queen Anne's County *(26)*. The soils are generally poorly drained or very poorly drained.

Flood plains are within the upper reaches of the rivers, creeks, and streams of the county. Periods of high rainfall or unusual tidal events inundate these areas with moving floodwaters. As the water recedes, sediments are left behind on the flood plains. The soils that formed in these sediments are typically poorly drained or very poorly drained and extremely variable in texture within short distances. Swamps are primarily along Tuckahoe Creek. The soils in the swamps

formed in decomposed organic matter derived from woody plant materials.

The survey area drains entirely into Chesapeake Bay. The Chester River, which drains the northwestern part of the county, provides the major outlet. Its major tributaries include Queenstown Creek, Reed Creek, the Corsica River, Southeast Creek, Foreman Branch, Red Lion Branch, and Unicorn Branch. The southern part of Kent Island, Piney Neck, and the western edge of Bennet Point drain into Eastern Bay. Wye Neck, Wye Island, and the Wye Mills area drain into the Wye River and the Wye East River. Tuckahoe Creek and its tributaries drain the eastern part of the county into the Choptank River.

Water Supply

Nearly all water supplies in Queen Anne's County are derived from ground-water sources, although some irrigation water is taken from surface water ponds and streams *(19)*. The geologic strata underlying the surface contain layers of clay and silt alternating with layers of sand and gravel. The permeable sand and gravel layers that are saturated with water are called aquifers. These aquifers and associated geologic formations dip gently seaward and generally occur at progressively greater depths going from the northwestern part of the county to the southeastern part *(24)*.

The Columbia aquifer in Queen Anne's County is between the surface and a depth of about 100 feet and is within the Pensauken Formation of Pleistocene age. It is used as a water source primarily in the northern and northeastern parts of the county *(19)*. Water quality is generally good. Because of the aquifer's proximity to the surface, however, it is susceptible to pollution from livestock production, onsite sewage disposal, and applications of fertilizer and to saltwater intrusion along Chesapeake Bay and tidal rivers *(24)*.

The Choptank and Calvert aquifers are contained in Miocene deposits of the same names. They provide minor amounts of water for domestic use, primarily in the southern and southeastern parts of the county. The aquifers occur between depths of 80 and 250 feet *(19)*.

The Piney Point Formation of Eocene age contains the Piney Point aquifer, one of the most important water-bearing formations in the Delmarva Coastal Plain *(20)*. It is used in the survey area only on a limited basis because it underlies only a small area in the southeastern part of the county.

The Aquia aquifer occurs in the Paleocene Aquia Formation. The formation is often referred to as Aquia Greensand because of the occurrence of green quartz sands containing the mineral glauconite *(19)*. The aquifer occurs between depths of 80 and 400 feet and is the most important aquifer in the county. Recharge areas occur in a band running from Charles County to Cecil County *(24)*. The formation is close to the surface at the northern end of Kent Island, and in these areas there is a potential for saltwater intrusion as well as contamination from other sources. The water is suitable for domestic use with little or no pretreatment. This aquifer provides municipal water for Centreville and Queenstown and domestic water for Grasonville and Kent Island *(19, 24)*.

The Monmouth and Matawan aquifers, located in sediments of the Upper Cretaceous Period, provide a significant amount of domestic water for the northern part of the county. They occur between depths of 400 and 480 feet. The Monmouth aquifer is used heavily for domestic supplies near Pondtown and in the northwestern part of the county. Both aquifers have a high iron content and require treatment. Their recharge areas run from Prince George's County, Maryland, to New Castle County, Delaware *(19, 24)*.

The Magothy aquifer, located in sediments of the Upper Cretaceous Period, has the potential to yield moderate or large amounts of ground water, particularly in the western part of the county. Water quality is good except for an excessively high iron content and the potential for saltwater intrusion near Chesapeake Bay. The aquifer normally occurs between depths of 480 to 600 feet. Recharge areas span a narrow belt across Prince George's, Anne Arundel, Kent, and Cecil Counties *(19, 24)*.

A series of sediments called the Potomac Group (Lower Cretaceous Period) occur between depths of 600 and 2,600 feet. The uppermost aquifers are the Patapso-Raritan aquifers, which have potential for future use. The Patuxent aquifer is one of the most productive water-bearing units in Maryland but is too deep in Queen Anne's County for current use *(19, 24)*.

Agriculture

In Queen Anne's County, the relatively long growing season, well-distributed rainfall, productive soils, and temperate climate are conducive to agricultural production. About 70 percent of the total land acreage, or about 165,349 acres, was in farmland in 1992. The market value of crop and livestock products sold in the county in 1992 totaled over 55 million dollars *(15)*.

Farms in the county have decreased in number but increased in size. In 1992, there were 413 farms in the county, a decrease of nearly 50 percent from 812 farms in 1959. The size of the average farm increased from 225 acres in 1959 to 400 acres in 1992 *(16, 30)*.

Corn, soybeans, and small grain production in Queen Anne's County is very important to Maryland's agricultural community. In 1992, the county ranked first in the state in production of soybeans and second in production of corn, wheat, and barley *(16)*.

In 1987, poultry and poultry products accounted for about half of the value of products sold from livestock and livestock products in Queen Anne's County. The county's other livestock and livestock products include cattle, dairy, hogs, and sheep *(16)*.

Natural Resources

Queen Anne's County has abundant and diverse natural resources that provide the basis for agriculture, community development, forestry, recreation, and wildlife.

Potential prime farmland in the county makes up almost 130,000 acres, or 55 percent of the land area. The soils in these areas are well drained or moderately well drained and level or gently sloping. An additional 45,000 acres would meet the requirements for prime farmland if limitations affecting plant growth were overcome. These limitations include a seasonal high water table and droughtiness. They can be overcome by providing adequate drainage or dependable irrigation.

Woodland covers approximately 58,000 acres, or about 24 percent of the land area in the county *(23)*. Important tree species include oaks, hickory, yellow-poplar, red maple, sweetgum, blackgum, holly, beech, dogwood, Virginia pine, and loblolly pine. Most of the woodland is privately owned and used for timber production, but substantial tracts occur in protected habitat areas.

The county has 258 miles of tidal shoreline and more than 18,000 acres of open water. This acreage does not include the large expanses of Chesapeake Bay or the major rivers. The combination of deep open water, tidal marshes, swamps, and uplands provides habitat for a variety and abundance of fish and wildlife. Commercial and recreational fishing and crabbing as well as hunting for deer, small game, and game birds are important activities in the survey area. Abundant opportunities for recreational boating and water activities are also available in the county.

Numerous county-owned parks and open areas and the state-owned Tuckahoe State Park and Wye Island Natural Resources Management Area are managed for fish and wildlife as well as for public recreation and agriculture. Several private wildlife and conservation organizations manage lands for wildlife. The county is home to several threatened or endangered species, including bald eagle, Delmarva fox squirrel, and dwarf wedge mussels.

Soils that are well drained or moderately well drained and level or gently sloping provide sites for homes, commercial buildings, and community development. Sand and gravel deposits provide sources for road building materials and construction. Abandoned borrow areas provide additional habitat for wildlife.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Centreville in the period 1961 to 1985. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 35.5 degrees F and the average daily minimum temperature is 26.5 degrees. The lowest temperature on record, which occurred on January 22, 1984, was -13 degrees. In summer, the average temperature is 74.3 degrees and the average daily maximum temperature is 85.5 degrees. The highest recorded temperature, which occurred on September 11, 1983, was 100 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The average annual total precipitation is 42.54 inches. Of this, about 25.1 inches, or 59 percent, usually falls in April through October. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 5.92 inches on August 13, 1955. Thunderstorms occur on about 28 days each year, and most occur between May and August.

The average seasonal snowfall is 21.4 inches. The greatest snow depth at any one time during the period of record was 24 inches, recorded on February 2, 1966. On the average, 16 days per year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 15.0 inches, recorded on February 19, 1979.

The average relative humidity in mid-afternoon is about 54 percent. Humidity is higher at night, and the average at dawn is about 78 percent. The sun shines 63 percent of the time possible in summer and 52 percent in winter. The prevailing wind is from the west.

Average windspeed is highest, between 10 and 11 miles per hour, from February to April.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify the soils. After describing the soils and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area are generally collected for laboratory analyses and for engineering tests. The data from these analyses and tests and from field-observed characteristics and soil properties are used to predict behavior of the soils under different uses. Interpretations are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a relatively high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in accurately locating boundaries.

This survey area was mapped at two levels of detail. At the more detailed level, map units are narrowly defined. Map unit boundaries were plotted and verified at closely spaced intervals. At the less detailed level, map units are broadly defined. Boundaries were plotted and verified at wider intervals. In the legend for the detailed soil maps, narrowly defined units are indicated by symbols in which the

first letter is a capital and the second is lowercase. For broadly defined units, the first and second letters are capitals.

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

Survey Procedures

This survey updates the soil survey of Queen Anne's County published in 1966 *(30)*. It provides additional data and soil interpretations and larger maps, which show the soils in greater detail. The soils in this survey are described to a greater depth than in the previous survey. Many of the soil series and map unit names have been changed because of new information and changes in the national system for soil classification. Though some soil boundaries have been readjusted, many are essentially the same as those in the original survey.

The general procedures followed in making the survey are described in the "National Soil Survey Handbook" of the Natural Resources Conservation Service and in the "Soil Survey Manual" *(28, 33)*. The previous soil survey of Queen Anne's County and other references were used to prepare the manuscript and to plan the soil transects.

Before fieldwork began, a preliminary evaluation was conducted. New soil mapping of several small blocks was compared to the published soil survey to evaluate soil boundary line placement. Color infrared aerial photographs, which were taken in March and April of 1981 and 1982 at a scale of 1:15840, were studied. These aerial photographs provided information that was significant in determining the location of certain soil boundaries, particularly in woodland areas. They were also used to locate representative areas for transects and sampling sites.

All of the profile descriptions from the 1966 report representing the modal or central concept of the soil series were investigated and described using new terminology and nomenclature. They were used as a starting point for evaluating the old map units. Transects were used to identify any changes needed in the central concept of the series and to determine map unit composition. The number of transects run for a map unit was based on the map unit's acreage and adjusted according to the variability observed. Transects generally consisted of 5 to 10 regularly spaced observations 50 to 200 feet apart and 6 feet in depth.

Some areas required remapping, particularly large woodland tracts, tidal marshes, swamps, and alluvial flood plains. In the previous soil survey, many of these areas were mapped with less detail and at a less accurate soil classification level. Adjusted or new soil boundaries were determined on the basis of spot checks, soil observations, and aerial photo interpretation. Some steeply sloping soil delineations were exaggerated in the 1966 survey; these were adjusted and, in very narrow areas, replaced with a symbol indicating a short, steep slope or escarpment.

Some of the soil series in the 1966 survey could not be used. New information on soil temperature, particle-size distribution, and water tables indicated the need for the establishment of new series. Many of the new series and some of the older, still used series were sampled for chemical and physical analyses and for analyses of engineering properties *(25)*. Full characterization analyses were made by the Natural Resources Conservation Service, National Soil Survey Laboratory, in Lincoln, Nebraska. Particle-size distribution and mineralogical analyses were made by the Pedology Research Laboratory, Department of Agronomy, University of Maryland. A description of the laboratory procedures can be obtained on request from the laboratories. The results of the analyses and studies can be obtained from the laboratories or from the state office of the Natural Resources Conservation Service.

Formation of the Soils

This section describes the factors of soil formation as they relate to the soils of Queen Anne's County. It also explains the morphology of the soils and the major processes in their development.

Factors of Soil Formation

A soil is a three-dimensional natural body consisting of mineral and organic material that can support plant growth. The nature of any soil at a given site is the result of the interaction of five general factors—parent material, climate, plants and animals, relief, and time. Parent material and climate affect the types of plants and animals that live in an area. These in turn are modified by relief over long periods of time during the process of soil formation. The interactions of the factors and the relative influence of each factor vary from place to place. In some areas one factor dominates in the formation of a soil and determines most of its properties. Local variations among the soils in Queen Anne's County mainly result from differences in parent material, relief, and time.

Parent Material

Parent material is the raw material acted on by soil-forming processes. It largely determines soil texture, which affects other properties, such as natural soil drainage and permeability. Parent material influences the mineralogy and physical and chemical composition of the soil and, to some extent, the rate at which soil formation takes place.

The soils in Queen Anne's County formed in many different kinds of parent material. Many of the soils formed in unconsolidated mineral sediments deposited by wind or water. These sediments were deposited on coastal plains and alluvial deltas. Because they were deposited in fluvial and marine environments, the sediments are referred to as fluviomarine. Other soils formed in a thin mantle of loess (windblown silty material) overlying the fluviomarine sediments or in recent alluvium deposited by streams. Some of the windblown deposits have been reworked by past alluvial action. There are also soils in Queen Anne's County that developed from organic parent material, resulting from the slow accumulation of plant residues in water.

The fluviomarine sediments in the eastern two-thirds of the county are orange to reddish brown, white, and pale brown sands and gravelly sands that have a high content of quartz and feldspathic minerals. These sediments, which make up the Pensauken Formation, are late Miocene and Pliocene in age and were deposited by the deltaic influence of the ancient Susquehanna and Delaware River systems *(21)*. They have been reworked during a marginal marine environment that was common to the entire Eastern shore.

Underlying most of the western part of the county, generally at elevations below 20 feet, are fluviomarine deposits of interstratified silt, clay, and fine and very fine sand. These deposits make up the Kent Island Formation. This formation is Pleistocene in age and may have originated in an estuary, the ancient and much larger Chesapeake Bay. According to one theory, the deposits may have been part of the bay's bottom prior to the formation of the modern bay *(21)*. Most of the sediments in this area were planed off by bay currents, and the result was a scarp that has its lower edge about 20 feet above sea level *(21)*. This terrace-scarp is visible in Queen Anne's County, at elevations between 20 and 60 feet, running north to south from Reed Creek at Wright's Neck Road to Wye Narrows in the southern part of the county *(22)*.

In many areas a deposit of loess lies on top of the sediments of the Kent Island Formation and on the western part of the Pensauken Formation. During the Pleistocene epoch, sea level was more than 300 feet lower because of the increased sizes of the polar and subpolar ice caps. The Susquehanna River flowed southeasterly within the channel at the bottom of the present-day Chesapeake Bay. At the end of the Pleistocene epoch, when the glaciers started to melt and the oceans were warming, the river transported silty sediment. During periods of flooding, this sediment was deposited outside of the channel onto the ancient river's flood plain, which is currently the bottom of the bay. Strong northwest winds blew across

the open flood plain, picking up the silt particles and depositing them onto land adjacent to the bay *(11)*. Matapeake, Nassawango, Mattapex, and Othello soils formed in this loess overlying the sandier estuarine and fluviomarine sediments. Because these soils developed from the same parent material, the differences between them are attributed to the other soil-forming factors.

Recent alluvium is soil material that is deposited by flood waters in and along present-day streams. The texture of the soil material varies depending on the speed of the floodwater, the duration of flooding, and the distance from the streambank. Soils that formed in recent alluvium can be highly stratified. The soil horizons are weakly expressed because the soil-forming processes are interrupted by each new deposition. The source of the alluvium generally is material eroded from other soils farther upstream in the watershed. Longmarsh and Zekiah soils formed in loamy alluvium on the narrow flood plains throughout the county. Longmarsh soils are more dominant on the wider flood plains of Tuckahoe Creek and Longmarsh Ditch.

Organic soils formed in decomposed plant material that accumulated on the surface of marshes or swamps at a rate that corresponded with the rise in sea level. The sea level has been rising in the survey area since the last period of glaciation. Marshes and swamps naturally age as they become filled with organic material derived from algae, sedges, rushes, and other water-tolerant plants. The plant residue accumulates because the permanently wet condition of the soils prevents oxidation and slows decomposition. Freshly exposed organic material commonly is reddish brown or black, depending upon the amount of decomposition that has occurred.

Many of the organic soils in tidal areas, such as Honga and Bestpitch soils, were influenced by salt water and by tidal action. These soils are along Chesapeake Bay, Eastern Bay, and the lower reaches of the major rivers and creeks of Queen Anne's County. Honga soils formed in organic deposits overlying mineral sediments, which were upland soils before the sea level rose. Areas of these marshes are known as submerged upland tidal marshes *(5)*. Bestpitch soils formed in deep organic deposits overlying silty and clayey mineral sediments that were deposited in still estuarine tidal creeks. The mineral material settled out in these waters and consequently is very fluid.

Other organic soils, such as Puckum soils, formed in decomposed woody plant material that accumulated in submerged river valleys and formed into swamps. Puckum soils occur primarily along Tuckahoe Creek.

Climate

Climate influences the rate of weathering, the amount and depth of leaching, the kind and amount of vegetation, and the decomposition rate and activity of organic soil elements. The climate of Queen Anne's County is humid and temperate. There are no significant differences in elevation across the county and no obstructions to the movement of winds, clouds, and rainstorms. Masses of air generally move through the county from a northerly or westerly direction, and they are warmed by the air that moves in periodically from the south and southwest. The annual precipitation is about 43 inches, and the mean annual air temperature is about 54 degrees F. Rainfall is almost uniformly distributed throughout the year but is at its highest level in August. During the growing season, the period from April through October, the average amount of rainfall is about 26 inches.

Because of this humid, temperate climate, most of the soils in the county are strongly weathered and leached. In most areas the soil material has weathered to a considerable depth because it has been exposed to climatic forces over a long period of time. Soils that are not strongly weathered, such as Galestown soils, formed mainly from quartz-rich materials that are resistant to weathering.

Most of the soils have been leached of a majority of their natural soluble salts and basic ions. As a result of this leaching, the soils in Queen Anne's County are mainly strongly acid to extremely acid. Some soils in tidal marshes, such as Bestpitch and Honga soils, are different because they receive additions of salts when they are inundated by brackish water.

Weathering and leaching have resulted in a low natural supply of plant nutrients in many of the soils. Some soils have a moderate supply of plant nutrients. Productivity of the soils that are low in plant nutrients can be greatly increased if the soils are properly managed. Because of the leaching of clay from the surface and subsurface layers and the formation of clay in place, the subsoil in most of the soils is enriched in clay. Alternating periods of wetting and drying cause prismatic or blocky structure to develop in the clay-enriched subsoil, such as in the subsoil of Corsica, Fallsington, and Whitemarsh soils. The alternating periods of wetting and drying, especially where there is organic material, are also responsible for the segregation and translocation of iron in many soils.

The soils in Queen Anne's County are not only affected by the present-day climate but are also affected by the various climatic conditions that have occurred during soil formation. Microflora occurring in

organic matter underlying the Kent Island Formation indicate that the climate had been cool temperate during the deposition of the formation (about 30,000 years ago). The microflora indicate the presence of pine, birch, and alder and of spruce or hemlock in some areas *(21)*. Gravel lines, which occur in some soils, may indicate periods of accelerated erosion and deposition under a wetter climate.

Detailed climatic information is provided in the section "General Nature of the Survey Area."

Plants and Animals

Living organisms, including vegetation, bacteria, fungi, animals, and humans, impact soil formation. The vegetation under which a soil forms influences such soil properties as color, structure, reaction, and content and distribution of organic matter. Plants extract water from the soil, recycle nutrients, and add organic matter to the soil. Decomposition of this organic matter darkens the surface layer. Gases derived from root respiration combine with water to form acids, which influence the weathering of minerals.

When the survey area was first settled by Europeans, the native vegetation consisted mainly of hardwood forests. Oak and hickory were the dominant species in most parts of the survey area. Yellow-poplar, holly, sweetgum, blackgum, and red maple were also common. Oak, poplar, and hickory commonly grew on the better drained soils, such as Downer, Ingleside, Matapeake, Nassawango, and Sassafras soils (fig. 3). Blackgum, red maple, and willow oak primarily grew on the poorly drained soils, such as Othello, Hurlock, and Whitemarsh soils. The windthrow of trees on these poorly drained soils resulted in the mixing of the soil's upper horizons, which disrupted the normal development of the soil profile.

Many of the metabolic processes carried out by bacteria, fungi, and other micro-organisms release organic acids, which affect soil development. These organisms decompose organic matter and release nutrients to growing plants. They influence the development of soil structure. Soil properties, such as drainage, temperature, and reaction, influence the type of micro-organisms living in the soil. Fungi are generally more active in the more acid soils, and bacteria are more active in the less acid soils.

Earthworms, insects, and small burrowing animals mix the soil and create small channels, which influence soil aeration and the percolation of water. This mixing of the soil, if extensive, can inhibit soil profile development to some extent. Earthworms help to incorporate crop residue and other organic matter into the soil. This organic material helps to improve soil tilth.

Human activities have significantly influenced soil formation in some areas. Evidence of presettlement human activity can be found in the soils of Queen Anne's County. Native American kitchen middens occur on uplands near rivers and streams, typically in slightly depressional areas of the landscape. They are characterized by thick, dark surface layers with a high content of organic matter, fragments of charcoal, and large concentrations of oyster shells (fig. 4). The horizonation and chemical properties of these kitchen midden soils are different from the adjacent soils in which they formed.

Clearing large areas of forests for cultivation, introducing new kinds of crops and other plants, and improving natural drainage have affected the development of soils and will continue to affect their development. Cultivation, which mixes the upper horizons and forms a plow layer, has accelerated erosion on sloping soils, affected soil structure and compaction, and lowered the content of organic matter. The drainage of wet soils has increased the decomposition rate of organic matter in the surface layer. Manure, chemical fertilizer, pesticides, and other chemicals that have been applied in cultivated and urban areas have chemically altered the soil. The addition of lime to increase soil reaction in areas of cropland has changed many soils from naturally acidic to basic. Excavation, earth-moving, paving, and other activities associated with community development bury the existing surface, mix the soil horizons, or entirely remove the soil horizons, thus permanently changing the physical properties and nature of the soil. Landfills, dumps, and waste disposal areas incorporate foreign materials into the soil and also destroy the existing features of the soil.

Relief

The relief, or topographic position, of a soil influences soil formation mainly through its effect on depth to the seasonal high water table, surface and subsurface drainage, the rate of water percolation, runoff, and erosion.

Queen Anne's County is entirely within the Atlantic Coastal Plain. Although slopes are generally less than 5 percent, in some places the slope is between 10 and 30 percent. The steeper slopes are mainly along the drainageways of the highly dissected watersheds of the Wye East River and the Chester River. These areas make up approximately 2 percent of the county.

Figure 3.—Pawpaw and other understory vegetation of the upland forest on Nassawango silt loam, 0 to 2 percent slopes.

Local differences in elevation are slight on Kent Island and in the area west of the Wye River; elevations are rarely above 20 feet. The central part of the county is a slightly undulating plain, well dissected by mature streams. It is between 40 and 80 feet in elevation. The highest elevations are in the central and

southern parts of the county. The highest point is 87 feet above sea level, near Starr. The salt marshes along Chesapeake Bay are at sea level.

The nearly level relief in parts of the county contributes to the slow drainage of many of the soils. Water flows very slowly over the soil surface into the main channels, especially in nearly level areas of the finer textured soils, such as Kentuck and Whitemarsh soils. In addition, water moves slowly through many of the soils, and artificial drainage of these soils is difficult.

Relief influences depth to water table and soil development. In the northeastern part of the county, where relief is broad, level, and slightly depressional,

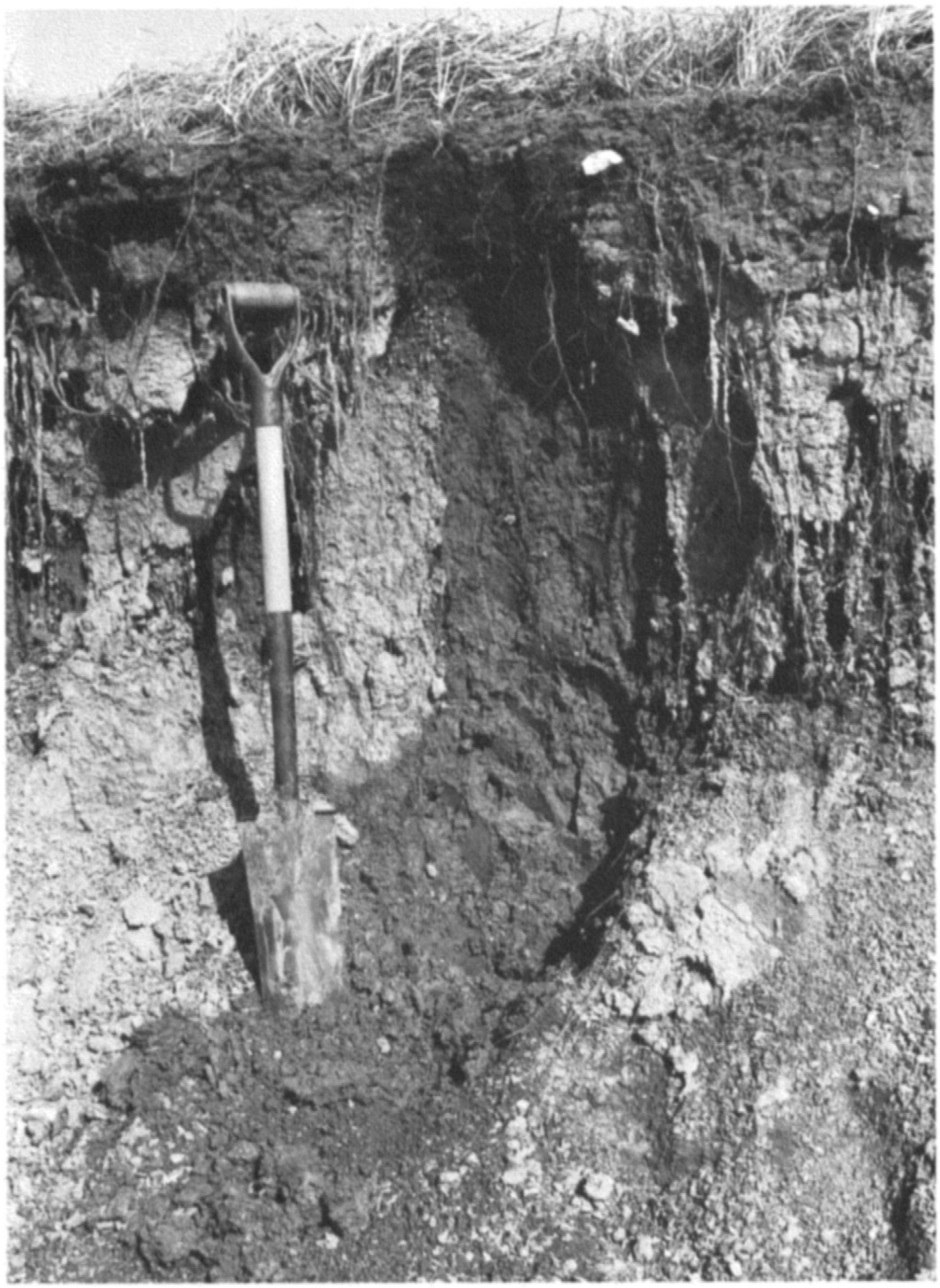


Figure 4.—An eroding shoreline on Hammonton sandy loam, 0 to 2 percent slopes, reveals an overthickened surface layer and a high concentration of oyster shells, indications of a kitchen midden.

Ingleside soils are commonly higher on the landscape than Hammonton soils. Ingleside soils do not have a seasonal high water table above a depth of 42 inches in most years, but Hammonton soils have a seasonal high water table between depths of 20 and 40 inches in most years. Hurlock and Corsica soils are lower on the landscape than Hammonton soils and have a seasonal high water table near or above the surface. In addition, Corsica soils occur in depressional areas and have a large accumulation of organic matter in the surface layer. Ingleside, Hammonton, Hurlock, and Corsica soils developed in the same kinds of parent material over similar periods of time. They are different because of the effect of a water table (saturation) on soil development. The relationship of these soils to one another along the landscape is referred as a drainage sequence, or catena. Matapeake, Nassawango, Mattapex, Othello, and Kentuck soils in the southern part of the county have a similar relationship.

Relief also influences the type of parent material in which a soil forms. In areas of Bestpitch and Honga soils, which are in tidal marshes at the lowest elevations, organic soil materials are continually deposited over mineral sediments. On the upland plains in the county, streams have downcut along drainageways, forming steep side slopes and exposing the older underlying sediments. These sediments are generally coarser textured than the silt-enriched loess materials on the upland plains, and the soils that formed on the side slopes are dominantly the coarse-textured Downer soils.

Time

The length of time that parent material has been in place and exposed to the weathering process, climate, and plants and animals influences the nature of the soil that forms.

The parent materials from which the soils in Queen Anne's County developed are unconsolidated sediments that were preweathered to some extent before they were deposited. Many easily weathered minerals were removed from the sediments long before the soils formed. However, the soils still reflect the amount of time that they have been exposed to the soil-forming processes.

The oldest sediments in the survey area were deposited between 25 million and 2 million years ago during the Miocene and Pliocene epochs. Other sediments in the county were deposited between 2 million and 10 thousand years ago during the Pleistocene epoch. During these epochs, many of the sediments have been exposed and reworked by geologic processes. During the last 20,000 years, most of the landscapes in the county have been stable enough for the processes of soil formation to take place.

The youngest soils in the county, including Bestpitch, Honga, Longmarsh, Puckum, and Zekiah soils, formed in recent (Quaternary) deposits on flood plains, in marshes, and in swamps. Organic and alluvial materials are still accumulating in marshes, in swamps, and on flood plains.

Morphology of the Soils

The morphological features of soil are the result of the soil-forming factors. They are expressed in the development of the different layers, or horizons, which make up a soil profile. The soil profile extends from the surface down to material that is little altered by the soil-forming processes.

Most soils have three major horizons—the A, B, and C horizons. Some soils, particularly those in forests and marshes, also have an O horizon at the surface. Numbers or lowercase letters indicate subdivisions of the major horizons. The Bt horizon, for example, has accumulated clay from the overlying horizons and is the most developed part of a B horizon. Sassafras soils have a Bt horizon.

The O horizon is an organic layer. It consists of organic material, such as twigs, leaves, dead roots, or humified organic matter, mixed with a small amount of mineral material. Many of the forested areas in the county have a thin O horizon. Soils in tidal marshes, such as Honga and Bestpitch soils, have a thick O horizon.

The A horizon is a mineral surface layer. It is darkened by humified organic matter. In cultivated areas, the material in this horizon is mixed with material from the underlying horizons and the result is a plow layer, or an Ap horizon. The amount of humus or organic matter in the horizon varies in different soils and ranges from very low to very high. Galestown soils have a weak A horizon that contains a small amount of organic matter. Corsica and Kentuck soils have a prominent A horizon that may contain as much as 10 percent organic matter.

The E horizon, which commonly occurs in well developed, undisturbed soils, is a mineral subsurface layer. It is characterized by intense leaching, or eluviation, of clay and iron. An E horizon occurs if considerable leaching has taken place and organic matter has not darkened the material. This horizon is normally lighter in color than any other horizon in the profile. In cultivated areas, the material of this horizon is commonly mixed with the overlying A horizon and an E horizon may not occur.

The B horizon is a mineral subsoil layer and normally underlies the Ap or E horizon. It is characterized by the accumulation, or illuviation, of clay, iron, aluminum, or other compounds leached from the surface layer. In some soils, such as Unicorn and Sassafras soils, the B horizon formed through alteration of the original material and through accumulation or illuviation. The alteration can result from weathering of the parent material; the release of iron, which results in rusty colors; or the development of soil structure in place of the structure of the original unconsolidated sediments. The B horizon commonly has blocky or prismatic structure. It generally is firmer and lighter in color than the A horizon and is darker than the C and E horizons. Most of the soils in Queen Anne's County have a B horizon.

The C horizon is a mineral substratum layer below an A or B horizon. It consists of material that is little altered by the soil-forming processes, but it may be modified by weathering. When the soil material of a C horizon is different than the parent material from which the overlying A and B horizons developed, the C horizon is labeled as a 2C horizon. Othello soils have a 2C horizon. Most of the soils in Queen Anne's County have a C or 2C horizon. In some young soils, such as those that formed in recent alluvium, the C horizon extends to or nearly to the surface. These soils do not have an E or B horizon. Longmarsh and Zekiah soils are examples of these soils.

Processes of Soil Formation

Soil forms through complex processes that can be grouped into four general categories—additions; removals, or losses; transfers (from one horizon to another); and transformations. These processes affect soil formation in differing degrees.

The accumulation and incorporation of organic matter in the surface layer is an example of an addition. This addition is responsible for the formation of the A horizon and is the main reason for the dark color of surface horizons in the mineral soils of Queen Anne's County. Heat from the sun and water from precipitation are also considered additions. These additions affect other processes in the soil by assisting with chemical and physical reactions.

Carbonates, soluble salts, and the soluble products of mineral weathering that are leached from the soil profile are examples of removals. In the soils of Queen Anne's County, some of these compounds were removed before the parent materials were deposited. Another example of a removal is erosion. On sloping soils most of the surface layer may be lost and redeposited at the bottom of the slope or in a waterway. The deposited materials are considered an addition.

The translocation of clay from the A and E horizons to the B horizon, which occurs in many soils in the county, is an example of a transfer. In this process, clay is dispersed in the upper horizons and subsequently moved with percolating water into the lower horizons, where it may be deposited by filtering or flocculation, or both. Thus the A or E horizon becomes a zone of eluviation, or loss, and the B horizon becomes a zone of illuviation, or gain. In Fallsington, Hammonton, Pineyneck, Sassafras, and Unicorn soils, the B horizon has more clay than the parent material and the A and E horizons have less clay. In the B horizon of most soils, thin clay films are in pores and on faces of peds. This clay has been transferred from the A and E horizons.

Another important example of a transfer is the leaching or diffusion of iron in the soil. This process takes place under saturated soil conditions in which there is no molecular oxygen. The naturally well drained soils in the county have a yellowish brown or reddish brown subsoil. The color results from finely divided iron oxide minerals (ferric iron) that coat the sand, silt, and clay particles. Under saturated conditions, as in the poorly drained soils in the county, the iron oxide minerals are chemically reduced to a more soluble form (ferrous iron). This form of iron is transported with water and can be transported completely out of the horizon. The remaining uncoated soil particles have a dominantly gray color. Normally, part of the iron is reoxidized and segregated into the form of stains, concretions, or bright yellow and red soft masses within the horizon. In the poorly drained Hurlock, Fallsington, Othello, and Whitemarsh soils, this type of transfer has occurred throughout the profile. In the mineral substratum of Bestpitch soils, this transfer has taken place but the reduced iron has not been removed from the horizons. The grayish blue colors in these soils indicate the occurrence of the reduced ferrous iron, which is known as gleying. Other examples of transfers include the physical mixing of soil by animals, plants (such as trees tipping over), and humans. Nutrient recycling (bringing mineral elements to the soil surface) by plants is also considered a transfer.

The weathering of primary materials to clay minerals in the soil is an example of a transformation. It occurs by physical and chemical means, such as by the transformation of micas and feldspars to clays. This process can increase the content of clay during soil formation. Another kind of transformation occurs

when clay is weathered from primary materials. Some iron generally is freed as a hydrated oxide. Depending on the degree of hydration, the oxide is generally red. Even a small amount of the oxide causes the subsoil to be reddish. Iron oxide colors the subsoil even in soils where there has not been enough accumulation of clay minerals to form a textural B horizon, as in Galestown soils.

The decomposition of organic matter in a soil is also considered a transformation. The organic soils in the county have varying degrees of decomposition. Honga and Bestpitch soils have a slight or moderate degree of decomposition in the organic layers, and Puckum soils have an extensive amount of decomposition in the organic materials.

General Soil Map Units

The general soil map shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or a building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

In areas along the borders of Caroline County, Maryland, Talbot County, Maryland, and Kent County, Delaware, boundaries on the general soil map and names of the general soil map units do not match those of the adjoining counties. These discrepancies are the result of the different ages of the soil surveys of these counties, changes in soil classification, and different proportions of the same soil in the different counties. Where some of these conditions exist, the adjoining counties match with similar kinds of soils.

1. Fort Mott-Galestown

Nearly level to moderately sloping, somewhat excessively drained and well drained soils that formed in sandy sediments

This map unit occurs on uplands, primarily on a terrace along the Chester River, from Kingstown in the west to Millington in the east. Elevations are primarily below 40 feet. Slopes are generally level but range from 0 to 10 percent.

This map unit makes up about 2 percent of the survey area. It is about 52 percent Fort Mott soils, 33 percent Galestown soils, and 15 percent soils of minor extent.

Fort Mott soils are well drained. They are on nearly level to moderately sloping broad uplands, stream terraces, and side slopes. They have a subsoil of sandy loam.

Galestown soils are somewhat excessively drained. They are on nearly level to moderately sloping terraces, sandy knolls, and side slopes. They have a surface layer and subsoil of loamy sand and a sandy substratum.

Minor soils include the well drained Downer soils on uplands and side slopes, the moderately well drained Hammonton soils in shallow depressions, and the poorly drained Hurlock soils on low-lying uplands and in broad depressions.

Most of this map unit is cleared and used for cropland. Only the sloping areas near streams and flood plains are wooded. The common trees are Virginia pine and scrub hardwoods. The soils in this unit warm up quickly in spring and are well suited to early season truck crops and general farming. During periods of low rainfall, however, the soils are droughty and susceptible to soil blowing. Ground-water pollution is a hazard in some areas due to the low water- and nutrient-holding capacity of the soils. Maintaining high levels of organic matter in the surface layer can help to improve the water- and nutrient-holding capacity. Most of the soils in this map unit have few limitations affecting woodland and nonagricultural uses.

2. Honga-Bestpitch

Nearly level, very poorly drained soils that formed in organic deposits overlying mineral sediments

This map unit occurs in tidal marshes and on tidally influenced flood plains. The largest portion of the map unit is located along Kent Narrows and Chesapeake Bay. Smaller areas are along the Chester River and its tributaries. Slopes range from 0 to 2 percent.

This map unit makes up about 2 percent of the survey area. It is about 46 percent Honga soils, 40 percent Bestpitch soils, 9 percent similar soils, and 5 percent other soils of minor extent.

Honga soils are very poorly drained and flooded

with daily tides. They are in brackish, submerged upland tidal marshes. They consist of organic materials 16 to 45 inches thick overlying mineral material which is firm and has moderate load-bearing strength.

Bestpitch soils are very poorly drained and tidally flooded. They are in brackish estuarine tidal marshes. They consist of organic materials 16 to 45 inches thick overlying fine textured mineral material which is fluid and has low load-bearing strength.

Minor soils include the poorly drained Carmichael, Othello, and Whitemarsh soils on the slightly elevated flats and the moderately well drained Butlertown, Mattapex, and Pineyneck soils on upland flats within the tidal marshes and side slopes adjacent to the tidal marshes.

This map unit is dominantly vegetated by salt-tolerant tidal grasses and shrubs, but woody vegetation grows in the slightly elevated areas within and around the tidal marshes. Because of tidal inundation, extreme wetness, and low load-bearing strength, the soils in this unit are unsuitable for most uses other than wildlife habitat and recreation. This unit is extremely valuable in providing wildlife habitat; maintaining water quality by filtering nutrients, sediments, and pollutants; helping to protect shorelines from erosion by absorbing wave energy; and absorbing floodwaters.

3. Ingleside-Pineyneck-Unicorn

Nearly level to steep, well drained and moderately well drained soils that formed in stratified sediments

This map unit occurs dominantly in the northern and middle portions of the county, in areas with highly dissected drainage patterns. It is on uplands, side slopes, and ancient alluvial terraces. Slopes are mainly less than 5 percent but range from 0 to 30 percent.

This map unit makes up about 49 percent of the survey area. It is about 40 percent Ingleside soils, 14 percent Pineyneck soils, 13 percent Unicorn soils, and 33 percent soils of minor extent.

Ingleside soils are well drained but have a wet substratum between depths of 48 and 72 inches. They are on nearly level or gently sloping uplands and ancient alluvial terraces and on moderately sloping side slopes. They have a surface layer and subsoil of sandy loam and a stratified sandy substratum.

Pineyneck soils are moderately well drained. They are on nearly level or gently sloping upland flats, in swales, in shallow depressions, and on moderately sloping side slopes. They have a surface layer of silt loam, a subsoil of loam or silt loam, and a stratified sandy substratum.

Unicorn soils are well drained but have a wet substratum between depths of 48 and 72 inches. They are on nearly level to moderately sloping uplands and moderately sloping or strongly sloping side slopes. They have a surface layer of silt loam or loam, a subsoil of loam, and a stratified sandy and loamy substratum.

The dominant minor soils are the well drained Downer and Sassafras soils on nearly level or gently sloping uplands and moderately sloping to steep side slopes; the moderately well drained Hammonton soils on upland flats and in shallow depressions; the poorly drained Hurlock and Carmichael soils on low-lying flats, in depressions, and on narrow flood plains; and the very poorly drained Corsica soils in depressions.

Most of this map unit is cleared and used for general crop production or for community housing and businesses. The common trees in the remaining second-growth forests are black oak, white oak, pignut hickory, and tulip poplar. Moderately sloping to steep areas are susceptible to erosion. Maintaining adequate surface cover throughout the year can help to minimize erosion. Except for the minor Downer and Sassafras soils, the soils in this map unit are limited by a seasonal high water table for most nonagricultural uses.

4. Longmarsh-Zekiah

Nearly level, very poorly drained and poorly drained soils that formed in recent alluvial sediments

This map unit occurs along streams throughout the survey area, but the larger delineations are along the flood plains of Tuckahoe Creek, Mason Branch, and Longmarsh Ditch. Slopes range from 0 to 2 percent.

This map unit makes up about 5 percent of the survey area. It is about 59 percent Longmarsh soils, 25 percent Zekiah soils, and 16 percent soils of minor extent.

Longmarsh soils are very poorly drained and frequently flooded. They are on nearly level flood plains. They have a surface layer of mucky loam and a sandy substratum.

Zekiah soils are poorly drained and frequently flooded. They are on nearly level flood plains. They have a surface layer of silt loam and a stratified loamy and sandy substratum and commonly have gravelly layers below a depth of 40 inches.

Minor soils include the very poorly drained Corsica soils and poorly drained Hurlock soils on the older, abandoned parts of the flood plains and the

moderately well drained Hammonton soils on low bench terraces and small portions of uplands contained within the flood plain of meandering streams.

Only small areas of this map unit are cleared and used for row crops and pasture. The existing trees are dominantly green ash, red maple, and blackgum. The soils in this unit are limited for urban development, forestry, and cultivation by frequent flooding and a high water table. This unit is important as nontidal wetlands. It is beneficial in providing habitat for wetland animals and migratory birds; in controlling floodwaters; and in maintaining water quality by filtering sediments, nutrients, and pollutants from surface and ground water before they reach open bodies of water.

5. Matapeake-Mattapex-Nassawango

Nearly level to moderately sloping, well drained and moderately well drained soils that formed in silty sediments

This map unit occurs primarily in the western and south-central portions of the county, on Kent Island and on uplands from Wye Island to Centreville. Slopes are dominantly less than 5 percent but range from 0 to 10 percent.

This map unit makes up about 17 percent of the survey area. It is about 21 percent Matapeake soils, 20 percent Mattapex soils, 20 percent Nassawango soils, 14 percent similar soils, and 25 percent other soils of minor extent.

Matapeake soils are well drained. They are on nearly level to moderately sloping uplands and side slopes. They have a surface layer and subsoil of silt loam and a sandy substratum.

Mattapex soils are moderately well drained. They are on nearly level to moderately sloping low uplands, in swales, in shallow depressions, and on side slopes. They have a surface layer and subsoil of silt loam and a loamy or sandy substratum.

Nassawango soils are well drained but have a wet substratum between depths of 48 and 72 inches. They are on nearly level or gently sloping uplands. They have a surface layer and subsoil of silt loam and a sandy substratum.

The dominant similar soils are the well drained Sassafras and Unicorn soils that have a wet substratum and are on nearly level or gently sloping uplands and moderately sloping side slopes; the moderately well drained Pineyneck soils on nearly level to moderately sloping uplands, in shallow swales, and in depressions; and the moderately well drained Butlertown soils that have a fragipan and are on nearly level or gently sloping upland flats, primarily on Kent Island and in the Grasonville-Bennets Point area.

The dominant minor soils are Carmichael, Othello, and Whitemarsh soils on low upland flats and in depressions.

This map unit is about 80 percent cleared land and 20 percent woodland. The cleared areas are mainly used for row crops, but some areas are used for nonfarm development. The common trees remaining in second-growth forest are black oak, white oak, tulip poplar, and pignut hickory. Due to the high silt content and low clay content of the surface layer, the soils in this unit are susceptible to soil blowing and water erosion. Maintaining adequate surface cover throughout the year can help to minimize erosion. The seasonal high water table in the Mattapex and Nassawango soils can limit their use for nonfarm purposes.

6. Whitemarsh-Hurlock-Carmichael

Nearly level, poorly drained soils that formed in silty and loamy sediments

This map unit occurs throughout the county. In the northeastern part of the survey area, near the Delaware State line, it occurs on a distinctive landscape that is dominated by circular depressions known as Delmarva bays, or whale wallows. In other areas, this unit occurs in the interior of broad interfluves with limited surface drainage and in depressions, in swales, and on narrow flood plains. Slopes range from 0 to 2 percent.

This map unit makes up about 25 percent of the survey area. It is about 31 percent Whitemarsh soils, 27 percent Hurlock soils, 27 percent Carmichael soils, and 15 percent soils of minor extent.

Whitemarsh soils are poorly drained. They are on nearly level upland flats, in swales, and in depressions. They have a surface layer and subsoil of silt loam with restricted permeability and a loam substratum.

Hurlock soils are poorly drained. They are on nearly level upland flats, in depressions, and on narrow flood plains. They have a surface layer and subsoil of sandy loam and a sandy substratum.

Carmichael soils are poorly drained. They are on nearly level upland flats, in swales, and in depressions. They have a surface layer and subsoil of loam and a sandy substratum.

The dominant minor soils having sandy and loamy surface textures are the well drained Ingleside and Unicorn soils that have a wet substratum and are on nearly level or gently sloping uplands, moderately sloping side slopes, and elevated rims around

depressions; the moderately well drained Hammonton and Pineyneck soils on nearly level or gently sloping upland flats and low ridges; and the very poorly drained Corsica soils in swales and closed depressions.

The dominant minor soils having silty textures are the very poorly drained Kentuck soils in swales and closed depressions; the poorly drained Othello soils on broad interfluvial uplands, in swales, and on narrow flood plains; the moderately well drained Mattapex soils on nearly level to moderately sloping low ridges or knolls; and the well drained Nassawango soils that have a wet substratum and are on nearly level or gently sloping uplands and side slopes.

This map unit is about 50 percent woodland and 50 percent cleared land. The common trees in the second-growth forests are blackgum, red maple, sweetgum, swamp chestnut oak, and willow oak. The cleared areas are used for row crops and pasture. Maintaining adequate surface and subsurface drainage is the main concern in managing cropland. The seasonal high water table limits the planting and harvesting of woodland and is a major limitation for nonfarm uses.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(31, 34)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 4 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol.* An example is Entisol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning wet, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Fluvaquents (*Fluv*, meaning flood plain, plus *aquent*, the suborder of the Entisols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Fluvaquents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is coarse-loamy, siliceous, acid, mesic Typic Fluvaquents.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the substratum within a series.

Soil Series and Detailed Soil Map Units

In this section, arranged in alphabetical order, each soil series recognized in the survey area is described. Each description is followed by the detailed map units associated with the series.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The location of the typical pedon is described, and coordinates generally are identified by the State plane grid system or by longitude and latitude. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(33)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(31)* and in "Keys to Soil Taxonomy" *(34)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units delineated on the detailed maps represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information about each map unit is given under the heading "Use and Management of the Soils."

A map unit delineation on a map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series.* Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of

erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Downer sandy loam, 2 to 5 percent slopes, is a phase of the Downer series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Mattapex-Butlertown silt loams, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Downer and Unicorn soils, 10 to 15 percent slopes, is an undifferentiated group in this survey area.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Urban land is an example.

Table 5 gives the acreage and proportionate extent of each map unit. Other tables (see “Contents”) give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

Bestpitch Series

The soils of the Bestpitch series are very deep and very poorly drained. Permeability is rapid in the organic deposits and slow in the mineral sediments. These soils formed dominantly in moderately decomposed organic deposits from salt-tolerant herbaceous plants overlying clayey mineral fluvial sediments with a high *n* value. They are located in brackish estuarine marshes along tidally influenced tributaries of Chesapeake Bay. Slopes range from 0 to 2 percent. Bestpitch soils are clayey, mixed, euic, mesic Terric Sulfihemists.

Bestpitch soils are similar to Honga soils and commonly are adjacent to Whitemarsh, Mattapex, Othello, Longmarsh, and Zekiah soils. They differ from the Honga soils in having mineral soil material with an *n* value greater than 0.7 underlying the organic layers. The Bestpitch soils differ from Whitemarsh, Mattapex, Othello, Longmarsh, and Zekiah soils in having formed in organic deposits overlying mineral sediments.

Typical pedon of Bestpitch peat; on a smooth 0 percent slope, in an estuarine tidal marsh, approximately 150 feet southwest of the west abutment of the Island Creek Road bridge across Island Creek; USGS Chestertown, Maryland topographic quadrangle; lat. 39 degrees 7 minutes 57 seconds N. and long. 76 degrees 3 minutes 12 seconds W.

Oi—0 to 5 inches; black (N 2/0) peat, fibric soil material; fiber content is three-fourths of the soil volume after rubbing; 30 percent mineral soil material; common fine, medium, and coarse live roots; neutral; gradual smooth boundary.

Oe1—5 to 10 inches; very dark gray (5Y 3/1) mucky peat, hemic soil material; fiber content is two-thirds of the soil volume after rubbing; 30 percent mineral soil material; few fine and medium live roots; neutral; clear smooth boundary.

Oe2—10 to 25 inches; dark olive gray (5Y 3/2) mucky peat, hemic soil material; fiber content is one-half of the soil volume after rubbing; 50 percent mineral soil material; few fine and medium live roots; neutral; clear smooth boundary.

Oe3—25 to 28 inches; very dark grayish brown (10YR 3/2) mucky peat, hemic soil material; fiber content is one-quarter of the soil volume after rubbing; 60 percent mineral soil material; neutral; clear smooth boundary.

Oe4—28 to 37 inches; black (5Y 2.5/2) mucky peat, hemic soil material; fiber content is one-quarter of the soil volume after rubbing; 60 percent mineral soil material; neutral; clear smooth boundary.

Cg1—37 to 57 inches; stratified dark brown (7.5YR 3/2), very dark grayish brown (10YR 3/2), and black (5Y 2.5/2) mucky silty clay loam; massive; friable, sticky; *n* value greater than 1.0, material flows easily between the fingers when squeezed; 10 percent masses of organic soil material; slightly acid; gradual smooth boundary.

Cg2—57 to 72 inches; black (5Y 2.5/2) mucky silty clay loam; massive; friable, sticky; *n* value greater than 1.0, material flows easily between the fingers when squeezed; 10 percent masses of organic soil material; slightly acid.

The thickness of the organic deposits ranges from 20 to 51 inches. Reaction ranges from slightly acid to

neutral in the soil's natural state. It can range from extremely acid to strongly acid upon drying the soil. Thin layers of silt and very fine sand are common in the organic horizons. The total sulfur content ranges from 0.75 to about 3.5 percent in individual layers within a depth of 40 inches. Conductivity of the saturation extract of the organic and mineral layers is typically greater than 16 millimhos per centimeter but ranges from 8 to greater than 16 millimhos per centimeter. Mineral horizons typically have an *n* value that is greater than 1.0 but that ranges from 0.7 to greater than 1.0 and have bulk densities of less than 1.00 gram per cubic centimeter.

The surface tier has hue of 10YR to 5Y, value of 2 to 5, and chroma of 0 to 2. It is typically hemic soil material. The fiber content after rubbing is greater than one-sixth of the soil volume. The content of mineral material ranges from 20 to 70 percent.

The subsurface tier has hue of 10YR to 5Y, value of 2 or 3, and chroma of 2. It is typically hemic soil material. The fiber content after rubbing ranges from one-sixth to three-fourths of the soil volume. The content of mineral material of the organic horizons ranges from 20 to 40 percent.

The bottom tier has hue of 10YR to 5Y, value of 2 or 3, and chroma of 0 to 2. It is typically hemic soil material, but texture includes sapric soil material, silty clay loam, and silt loam. The fiber content after rubbing is less than three-quarters of the soil volume. The content of mineral material in the organic horizons ranges from 20 to 75 percent.

In some pedons the subsurface and bottom tiers include the mineral horizon.

The Cg horizon has hue of 7.5YR to 2.5Y, value of 2 to 4, and chroma of 0 to 2. It is typically silty clay loam, but texture ranges from silt loam to silty clay. Some pedons have thin sandy mineral layers less than 1 inch thick stratified within the horizon. The content of organic matter ranges from less than 5 percent to 20 percent. Some pedons have thin organic layers or masses stratified within the mineral horizons.

Bp—Bestpitch peat

Composition

Bestpitch soil and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Estuarine tidal marshes
Slope: 0 to 2 percent
Note: Natural vegetation is dominantly saltmeadow cordgrass, saltmarsh (smooth) cordgrass, saltgrass, and rose mallow. This map unit is best suited to habitat for wetland wildlife. The natural vegetation and soil provide suitable habitat for the feeding and nesting of waterfowl and muskrats. The soil is a valuable storage medium for the retention of nutrients (nitrogen and phosphorus), floodwaters, sediment, and potential pollutants.

Component Description

Surface layer texture: Peat
Depth class: Very deep (more than 60 inches)
Drainage class: Very poorly drained
Dominant parent material: Organic deposits over clayey estuarine sediments
Flooding: Frequent
Kind of water table: Apparent
Ponding: Brief
Salt affected: Saline within a depth of 30 inches
Available water capacity: Very high
Note: Reaction becomes extremely acid to strongly acid upon drying the soil. There is a moderate or severe erosion hazard by water along drainageways and coastlines. The load-bearing capacity is very low throughout the profile. The content of reduced sulfur compounds is high in the organic layers and moderate in the mineral substratum.

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Honga and similar soils supporting vegetation on the marshes adjacent to upland areas
- Water areas, such as meandering tidal creeks and salt pannes
- Soils that have organic surface layers that are thinner than those of the Bestpitch soil; along tidal creeks
- Soils that do not have mineral layers in the substratum

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Butlertown Series

The soils of the Butlertown series are very deep and moderately well drained. Permeability is

moderately slow. These soils formed in silty eolian or alluvial sediments and underlying sandy alluvial sediments. They are on upland flats, low ridges, and side slopes. Slopes range from 0 to 5 percent. Butlertown soils are fine-silty, mixed, mesic Typic Fragiudults.

Butlertown soils are in landform positions similar to those of Matapeake and Mattapex soils and are commonly adjacent to Othello soils. Othello soils are poorly drained and are in the lower landform positions. Matapeake and Mattapex soils do not have a fragipan.

Typical pedon of Butlertown silt loam in an area of Mattapex-Butlertown silt loams, 2 to 5 percent slopes; on Kent Island near Chester, about 2,200 feet south along Cox Neck Road from Route 50, about 2,000 feet east of Cox Neck Road; USGS Kent Island, Maryland topographic quadrangle; lat. 38 degrees 58 minutes 9 seconds N. and long. 76 degrees 17 minutes 11 seconds W.

Oi—0 to 2 inches; partially decomposed leaves and twigs.

A—2 to 4 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable, slightly sticky, slightly plastic; many fine and medium and few coarse roots throughout; common very fine and fine interstitial pores; very strongly acid; clear wavy boundary.

E—4 to 10 inches; light yellowish brown (10YR 6/4) silt loam; weak fine subangular blocky structure; very friable, slightly sticky, slightly plastic; common fine and many medium roots throughout and few coarse roots; common very fine and fine tubular pores; very strongly acid; clear smooth boundary.

BE—10 to 16 inches; light yellowish brown (10YR 6/4) silt loam; weak medium subangular blocky structure; friable, slightly sticky, plastic; common fine and medium and few coarse roots throughout; common fine and medium tubular pores; very strongly acid; clear smooth boundary.

Bt1—16 to 21 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable, slightly sticky, plastic; common fine and medium roots throughout; common very fine and fine tubular pores; common medium distinct yellowish brown (10YR 5/6) soft iron accumulations and few medium distinct pale brown (10YR 6/3) iron depletions; very few distinct strong brown (7.5YR 5/6) clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt2—21 to 29 inches; brown (10YR 5/3) silt loam; weak coarse prismatic structure parting to moderate medium platy; firm, slightly sticky, plastic; few fine and medium roots in cracks; common very fine and fine tubular pores; common medium faint yellowish brown (10YR 5/4) and few medium distinct strong brown (7.5YR 4/6) soft iron accumulations and few medium distinct light brownish gray (10YR 6/2) iron depletions; few prominent brown (7.5YR 5/4) clay films on faces of peds and in pores; very strongly acid; clear wavy boundary.

Btx—29 to 33 inches; yellowish brown (10YR 5/6) silt loam; weak coarse prismatic structure parting to moderate medium platy; very firm, slightly sticky, plastic; few fine and medium roots in cracks; few very fine and fine tubular pores; common medium distinct strong brown (7.5YR 5/8) soft iron accumulations and common medium distinct light brownish gray (10YR 6/2) iron depletions; few distinct strong brown (7.5YR 5/6) clay films on faces of peds; very strongly acid; clear wavy boundary.

2BCx—33 to 48 inches; yellowish brown (10YR 5/4) loam; weak coarse prismatic structure parting to weak medium platy; very firm, slightly sticky, slightly plastic; few fine and medium roots in cracks; common very fine and fine vesicular pores; vertical lenses of very pale brown (10YR 7/3) loamy fine sand on prism faces; common fine distinct dark brown (7.5YR 3/2) soft iron and manganese accumulations at top of horizon; common fine and medium distinct strong brown (7.5YR 5/8) soft iron accumulations and common fine and medium distinct light brownish gray (10YR 6/2) iron depletions; strongly acid; clear wavy boundary.

2C1—48 to 58 inches; brownish yellow (10YR 6/6) loamy fine sand; massive; firm, slightly sticky, slightly plastic; few fine roots; few very fine and fine tubular pores; few medium distinct light gray (10YR 7/2) iron depletions; strongly acid; clear smooth boundary.

2C2—58 to 64 inches; strong brown (7.5YR 4/6) loamy fine sand; massive; very friable; few medium distinct brownish yellow (10YR 6/6) iron depletions; very strongly acid; abrupt wavy boundary.

2C3—64 to 74 inches; stratified 50 percent light yellowish brown (10YR 6/4) and 50 percent strong brown (7.5YR 5/6) fine sand; single grain; loose; few medium prominent yellowish red (5YR 4/6) soft iron accumulations and common medium distinct very pale brown (10YR 7/3) iron depletions; strongly acid.

The thickness of the solum ranges from 40 to 66 inches. Depth to the fragipan ranges from 25 to 40

inches. Reaction is very strongly acid or strongly acid in unlimed areas and ranges from moderately acid to neutral in limed areas. The content of coarse fragments ranges from 0 to 3 percent in the solum and from 0 to 5 percent in the C horizon.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 to 4. It silt loam or loam.

The E and BE horizons have hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 or 4. They are silt loam or loam.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 to 6. Redoximorphic features may occur. The horizon is silt loam or silty clay loam.

The Bx horizon has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 3 to 8. It is mottled with chroma of 1 to 8. It is silt loam, loam, or fine sandy loam.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 2 to 8. It is silt loam, loam, or very fine sandy loam. The 2C horizon has textures ranging from loamy fine sand to clay loam.

Carmichael Series

The soils of the Carmichael series are very deep and poorly drained. Permeability is moderate in the subsoil and rapid to slow in the substratum. These soils formed in unconsolidated stratified alluvial and marine sediments capped with a thin veneer of loamy sediments having a high content of silt. They are on upland flats and in depressions. Slopes range from 0 to 2 percent. Carmichael soils are coarse-loamy, mixed, mesic Typic Endoaquults.

Carmichael soils are commonly adjacent to Butlertown, Downer, Hammonton, Hurlock, Ingleside, Pineyneck, Corsica, Sassafras, and Unicorn soils. Butlertown soils are well drained or moderately well drained and have a fine-silty particle-size control section. The well drained Downer, Ingleside, Sassafras, and Unicorn soils and the moderately well drained Pineyneck and Hammonton soils are in the slightly higher landform positions. The poorly drained Hurlock soils have sandy loam textures in the solum and do not have a fragipan. The very poorly drained Corsica soils do not have a fragipan and are in the slightly lower landform positions.

Typical pedon of Carmichael loam; in a wooded area, southeast of the town of Roberts, 1.3 miles south of the intersection of Route 19 and Carter Road, 250 feet southwest of Carter Road (enter woods from Carter Road, 120 feet northwest of driveway on the north side of Carter Road); USGS Price, Maryland topographic quadrangle; lat. 39 degrees 5 minutes 23 seconds N. and long. 75 degrees 54 minutes 1 second W.

Oi—0 to 1 inch; slightly decomposed needles, leaves, twigs, and other woody materials.

A—1 to 3 inches; black (10YR 2/1) loam; weak fine subangular blocky structure; friable, slightly sticky, nonplastic; common very fine and fine roots throughout; few very fine and fine tubular pores; extremely acid; abrupt wavy boundary.

Eg—3 to 8 inches; gray (2.5Y 6/1) loam; weak medium subangular blocky structure; friable, slightly sticky, nonplastic; common very coarse and coarse and few fine roots throughout; common very fine and fine pores; common medium distinct brownish yellow (10YR 6/6) iron accumulations throughout; extremely acid; clear smooth boundary.

BEg—8 to 15 inches; gray (2.5Y 6/2) loam; moderate medium subangular blocky structure; friable, slightly sticky, nonplastic; common fine and few very fine roots throughout; few very fine and fine pores; common medium distinct dark yellowish brown (10YR 4/4) and many medium and coarse distinct yellowish brown (10YR 5/8) iron accumulations throughout; extremely acid; clear smooth boundary.

Btg1—15 to 19 inches; dark gray (N 4/0) loam; moderate medium platy structure; firm, slightly sticky, slightly plastic; common fine roots between peds and few very coarse roots throughout; common very fine and fine pores; common medium distinct yellowish brown (10YR 5/6) iron accumulations and common fine and medium distinct light gray (2.5Y 7/2) iron depletions; 2 percent subrounded mixed gravel; extremely acid; clear wavy boundary.

Btg2—19 to 25 inches; light gray (10YR 7/1) and light olive gray (5Y 6/2) silt loam; weak coarse and very coarse prismatic structure parting to moderate medium subangular blocky; firm, slightly sticky, slightly plastic; brittle when moist in some parts of the matrix; common fine roots in cracks and few very coarse roots between peds; common fine pores; common medium distinct brownish yellow (10YR 6/6) iron accumulations and common medium faint white (N 8/0) iron depletions; few prominent continuous gray (10YR 5/1) clay films on vertical and horizontal faces of peds; 2 percent subrounded mixed gravel; extremely acid; clear wavy boundary.

Btg3—25 to 33 inches; light olive gray (5Y 6/2) and light gray (10YR 7/1) silt loam; weak coarse prismatic structure parting to weak medium

subangular blocky; firm, slightly sticky, slightly plastic; brittle when moist in some parts of the matrix; very few very coarse roots in cracks and few fine and medium roots between peds; common very fine tubular pores; common coarse prominent strong brown (7.5YR 5/8) and common medium prominent brownish yellow (10YR 6/6) iron accumulations; few prominent continuous gray (10YR 5/1) clay films on vertical and horizontal faces of peds; extremely acid; abrupt smooth boundary.

2Cg1—33 to 37 inches; 60 percent light gray (10YR 7/2) and 40 percent white (10YR 8/1) sand; single grain; loose; few medium roots; few very fine pores; very strongly acid; abrupt smooth boundary.

3Cg2—37 to 46 inches; 50 percent gray (10YR 5/1) and 50 percent light gray (10YR 7/1) sandy loam; massive; friable, slightly sticky; very few fine roots in cracks; few very fine and fine tubular pores; many medium distinct brownish yellow (10YR 6/8) iron accumulations; few dark gray (7.5YR 4/1) clay films on upper surfaces of peds; 2 percent subrounded mixed gravel; extremely acid; abrupt irregular boundary.

3Cg3—46 to 52 inches; light gray (5Y 7/1) sandy loam; massive; friable, slightly sticky, slightly plastic; few very fine and fine tubular pores; few fine prominent brown (7.5YR 5/2) oxidized zones around roots and root channels; 1 percent subrounded mixed gravel; extremely acid; clear wavy boundary.

3Cg4—52 to 62 inches; light gray (5Y 7/1) sandy loam; massive; very friable, slightly sticky, nonplastic; few very fine and fine pores; common medium distinct brownish yellow (10YR 6/6) and common fine prominent strong brown (7.5YR 5/8) iron accumulations; common medium faint white (N 8/0) iron depletions; 2 percent subrounded mixed gravel; extremely acid.

The thickness of the solum ranges from 24 to 60 inches. The content of rock fragments, dominantly subrounded chert and quartzite gravel, ranges from 0 to 5 percent in the solum and from 0 to 15 percent in the C horizon. The silt content in the A horizon, E horizon, and upper part of the Bt horizon ranges from 35 to 60 percent. Reaction ranges from extremely acid to strongly acid in unlimed areas to neutral in heavily limed areas.

The A or Ap horizon has hue of 10YR, value of 2 to 5, and chroma of 1 to 3. It is loam or silt loam. Iron accumulations, if they occur, have hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 8.

The Eg horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 to 3. It is typically loam and is less commonly silt loam, fine sandy loam, or very fine sandy loam. Iron accumulations have hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6.

The BEg horizon, if it occurs, has hue of 10YR or 2.5Y, value of 6, and chroma of 1 or 2. It is loam or fine sandy loam. Iron accumulations have hue of 10YR, value of 4 to 6, and chroma of 4 to 8.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 0 to 2. It is typically loam or silt loam but may include thin layers of sandy loam or fine sandy loam. It has iron accumulations.

The 2Cg or 3Cg horizon has hue of 7.5YR to 5Y, value of 3 to 7, and chroma of 0 to 3. It is commonly sand, loamy sand, or sandy loam, but texture ranges to loam and silt loam. The horizon is frequently stratified. It commonly has iron accumulations.

Some pedons have a thin 2C horizon that is similar to the 2Cg horizon but has chroma of 3 to 8.

Some pedons have a buried A horizon below a depth of 50 inches.

Ca—Carmichael loam

Composition

Carmichael soil and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Low-lying uplands, depressions, and swales
Slope: 0 to 2 percent

Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Poorly drained
Dominant parent material: Loamy eolian deposits and/or fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Available water capacity: High

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see “Contents”).

Inclusions

- Pineyneck and similar soils in the higher landform positions
- Corsica soils in depressions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Corsica Series

The soils of the Corsica series are very deep and very poorly drained. Permeability is moderate in the solum and moderate to rapid in the substratum. These soils formed in loamy alluvial sediments overlying sandy fluvial coastal plain sediments. They are in upland swales and depressions. Slopes range from 0 to 2 percent. Corsica soils are fine-loamy, mixed, mesic Typic Umbraquults.

Corsica soils are commonly adjacent to Carmichael, Downer, Hammonton, Hurlock, Ingleside, and Sassafras soils. Sassafras soils are well drained. Downer and Ingleside soils are well drained and have less than 18 percent clay in the particle-size control section. Carmichael, Hammonton, and Hurlock soils have a coarse-loamy particle-size control section. In addition, Carmichael and Hurlock soils are poorly drained and Hammonton soils are moderately well drained.

Typical pedon of Corsica mucky loam; in a wooded area, approximately 1.4 miles west-northwest of the town of Starr, 1.2 miles west along Grange Hall Road from Starr, approximately 3,500 feet northwest along a lane to woods, 30 feet west of the lane; USGS Wye Mills, Maryland topographic quadrangle; lat. 38 degrees 58 minutes 48 seconds N. and long. 76 degrees 2 minutes 8 seconds W.

Oi—0 to 2 inches; slightly decomposed leaves and twigs from loblolly pine, sweetgum, and oak. (0 to 4 inches thick)

A—2 to 12 inches; black (10YR 2/1) mucky loam; weak fine granular structure; very friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots throughout; few very fine tubular pores; very strongly acid; clear smooth boundary.

BEg—12 to 18 inches; light brownish gray (2.5Y 6/2) sandy loam; weak fine subangular blocky structure; very friable, slightly sticky, slightly plastic; few fine and medium and very few coarse roots; few very fine tubular pores; few medium distinct light olive brown (2.5Y 5/4) iron accumulations; very strongly acid; clear smooth boundary.

Btg1—18 to 31 inches; light gray (2.5Y 7/2) sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky, plastic; common fine and very fine roots; few fine and medium tubular pores; common medium distinct light yellowish brown (2.5Y 6/4) and few medium prominent strong brown (7.5YR 5/8) iron accumulations; common prominent dark gray (10YR 4/1) clay films on faces of peds; very strongly acid; clear smooth boundary.

Btg2—31 to 40 inches; light gray (2.5Y 7/2) sandy loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and very fine roots; few fine and medium tubular pores; common medium distinct light yellowish brown (2.5Y 6/4) and few medium prominent strong brown (7.5YR 5/8) iron accumulations; common prominent dark gray (10YR 4/1) clay films on faces of peds; very strongly acid; clear smooth boundary.

BCg—40 to 48 inches; gray (10YR 6/1) sandy loam; weak coarse subangular blocky structure; friable, slightly sticky, nonplastic; few fine and very fine roots; common very fine and fine tubular pores; few medium distinct light yellowish brown (10YR 6/4) iron accumulations; very strongly acid; clear wavy boundary.

2Cg1—48 to 64 inches; stratified light gray (10YR 7/1) clay loam and strong brown (7.5YR 5/6) loamy sand; massive; friable, slightly sticky, slightly plastic; few fine and very fine roots; common very fine tubular pores; very strongly acid; clear wavy boundary.

2Cg2—64 to 72 inches; gray (5Y 6/1) clay loam; massive; friable, slightly sticky, plastic; few fine and very fine tubular pores; few fine prominent strong brown (7.5YR 5/6) iron accumulations; strongly acid.

The thickness of the solum ranges from 30 to 55 inches. Reaction ranges from extremely acid to strongly acid in unlimed areas.

The A horizon has hue of 10YR to 5Y, value of 2 or 3, and chroma of 0 to 2. It is mucky loam, mucky silt loam, or loam. It has iron accumulations.

The Eg or BEg horizon, if it occurs, has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is loam, silt loam, fine sandy loam, or sandy loam. Iron accumulations have hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 4 to 6.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2. It is typically clay loam, sandy clay loam, sandy loam, or loam but can be silt loam or silty clay loam in part of the argillic horizon. Iron accumulations have hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 4 to 8. Iron depletions, if they occur, have hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2.

The BCg horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 6 or 7, and chroma of 1 or 2. It is commonly sandy loam or sandy clay loam. It is less commonly loam, clay loam, loamy sand, or the gravelly analogues of these textures. The content of mixed gravel ranges from 0 to 30 percent. The horizon has iron accumulations.

The Cg or C horizon has hue of 7.5YR to 5Y, value of 5 to 8, and chroma of 0 to 3. It is commonly stratified and has textures ranging from sand to clay loam and including their gravelly analogues. The content of mixed gravel ranges from 0 to 30 percent. The horizon has iron accumulations and depletions.

An Ab horizon occurs in some pedons below a depth of 60 inches.

Co—Corsica mucky loam

Composition

Corsica soil and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Delmarva bays
Slope: 0 to 2 percent
Note: Most areas of this map unit are used as woodland and wildlife habitat; however, some small areas have been drained and are used for cropland and pastureland. The natural vegetation and soil provide suitable habitat for the feeding and nesting of small mammals, reptiles, amphibians, and waterfowl. The soil is a valuable storage medium for the retention of nutrients (nitrogen and phosphorus), floodwaters, sediment, and potential pollutants.

Component Description

Surface layer texture: Mucky loam
Depth class: Very deep (more than 60 inches)
Drainage class: Very poorly drained
Dominant parent material: Loamy fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Ponding: Very long
Available water capacity: High

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Kentuck soils on the lowest part of circular depressions
- Hammonton soils on narrow ridges typically surrounding circular depressions
- Ingleside soils on narrow ridges surrounding circular depressions
- Fallsington and similar soils in the slightly higher landform positions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Downer Series

The soils of the Downer series are very deep and well drained. Permeability is moderately rapid in the subsoil and moderate to rapid in the substratum. These soils formed in unconsolidated stratified coastal plain sediments. They are on uplands and ancient alluvial terraces of Chesapeake Bay and its major tributaries. Slopes range from 0 to 30 percent. Downer soils are coarse-loamy, siliceous, mesic Typic Hapludults.

Downer soils are similar to Greenwich and Sassafras soils and are commonly adjacent to Fort Mott, Galestown, Hammonton, Ingleside, and Unicorn soils. The Downer soils differ from Sassafras soils in having less clay in the B horizon. They differ from Greenwich soils in having less silt in the solum. The Downer soils have more clay in the B horizon than Galestown soils. They have thinner surface and subsurface layers than Fort Mott soils. They do not have the grayish mottles that are typical of the B horizon of Hammonton soils and the substratum of Ingleside and Unicorn soils.

Typical pedon of Downer sandy loam, 2 to 5 percent slopes; in a cultivated field, 50 feet south of Coleman Road, approximately 3,000 feet east along Coleman Road from its intersection with Route 290 (Dudley Corners Road), close to Route 301 near Pondtown; USGS Church Hill, Maryland topographic quadrangle; lat. 39 degrees 12 minutes 6 seconds N. and long. 75 degrees 53 minutes 24 seconds W.

Ap—0 to 6 inches; dark brown (10YR 4/3) sandy loam; weak fine granular structure; very friable, slightly sticky, slightly plastic; common fine roots; many very fine and common fine random tubular pores; neutral; abrupt smooth boundary.

Bt1—6 to 18 inches; dark yellowish brown (10YR 4/6)

sandy loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common very fine and fine and few medium random tubular pores; common distinct clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2—18 to 30 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; friable, slightly sticky, nonplastic; few fine roots; common very fine and fine random tubular pores; common faint clay films on faces of peds; slightly acid; clear wavy boundary.

BC—30 to 38 inches; yellowish brown (10YR 5/6) coarse sandy loam; weak medium subangular blocky structure; very friable; few fine roots; common very fine and few fine irregular pores; many fine grains of black sand; 2 percent gravel; slightly acid; clear smooth boundary.

C1—38 to 60 inches; brown (7.5YR 5/4) loamy sand; common medium faint yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; very friable; few fine roots; common very fine and few fine irregular pores; 5 percent gravel; slightly acid; clear smooth boundary.

C2—60 to 72 inches; strong brown (7.5YR 5/6) loamy sand; few medium distinct very dark gray (10YR 3/1) mottles; massive; very firm, slightly sticky; 10 percent gravel and ironstone fragments; strongly acid.

The thickness of the solum ranges from 20 to 55 inches. Reaction ranges from extremely acid to strongly acid in unlimed areas and from moderately acid to neutral in limed areas.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. It is sandy loam or loamy sand. The content of mixed subrounded gravel ranges from 0 to 5 percent.

Some pedons have an E or BE horizon with hue of 10YR, value of 4 to 6, and chroma of 3 to 6. This horizon is loamy sand, sandy loam, or loamy coarse sand. The content of mixed subrounded gravel ranges from 0 to 5 percent.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It is commonly sandy loam, but some pedons have thin layers of sandy clay loam. Mottles or lamellae have hue of 10YR or 5YR, value of 4 to 6, and chroma of 3 to 8. The content of mixed subrounded gravel ranges from 0 to 15 percent.

The BC horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is commonly loamy sand or sandy loam and is less commonly sand or the coarse or gravelly analogues of these textures. The content of mixed subrounded gravel ranges from 0 to 25 percent. Mottles or lamellae have hue of 7.5YR or 10YR, value of 3 to 7, and chroma of 3 to 6.

The C horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 4 to 8. It is loamy sand, sand, or loamy coarse sand or, in some areas, their gravelly analogues. Strata of sandy loam or loam are in some pedons. The content of mixed subrounded gravel ranges from 0 to 50 percent.

DhC—Downer-Hammonton sandy loams, 5 to 10 percent slopes

Composition

Downer soil and similar soils: 40 percent
Hammonton soil and similar soils: 40 percent
Inclusions: 20 percent

Setting

Landform: Uplands and side slopes
Slope: 5 to 10 percent
Note: Included in this map unit are small areas with slopes of less than 5 percent.

Component Description

Downer

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Sandy fluviomarine sediments
Flooding: None
Available water capacity: Low
Note: Gravel deposits on the surface or throughout the profile are common, especially in areas where elevations are between 40 and 60 feet.

Hammonton

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Sandy fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Available water capacity: Low
Note: Gravel deposits on the surface or throughout the profile are common, especially in areas where elevations are between 40 and 60 feet.

A typical description of each soil is included, in alphabetical order, in this section. Additional

information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see “Contents”).

Inclusions

• Ingleside soils in the flatter areas
• Galestown and Fort Mott soils on sandy ridges and side slopes
• Pineyneck soils and soils that have more clay in the subsoil than the Downer and Hammonton soils, in swales and on footslopes

Management

For general and detailed information about managing this map unit, see the section “Use and Management of the Soils.”

DoB—Downer sandy loam, 2 to 5 percent slopes

Composition

Downer soil and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Upland flats, knolls, side slopes, and stream terraces
Slope: 2 to 5 percent
Note: Slopes are dominantly 2 to 3 percent.

Component Description

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Sandy fluviomarine sediments
Flooding: None
Available water capacity: Low
Note: Gravel deposits on the surface or throughout the profile are common, especially in areas where elevations are between 40 and 60 feet.

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see “Contents”).

Inclusions

• Fort Mott soils on sandy ridges and shoulders of slopes along drainageways
• Ingleside and similar soils in the slightly lower landform positions
• Pineyneck soils and other moderately well drained soils in slight depressions and swales

Management

For general and detailed information about managing this map unit, see the section “Use and Management of the Soils.”

DOE—Downer soils, 15 to 30 percent slopes

Composition

Downer and similar soils: 80 percent
Inclusions: 20 percent

Setting

Landform: Uplands and side slopes
Slope: 15 to 30 percent

Component Description

Surface layer texture: Loamy sand and sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Sandy fluviomarine sediments
Flooding: None
Available water capacity: Low
Note: Gravel deposits on the surface or throughout the profile are common.

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see “Contents”).

Inclusions

• Small areas that have slopes of less than 15 percent or more than 30 percent
• Galestown and Fort Mott soils in landform positions similar to those of the Downer soils
• Unicorn and similar soils on the lower part of slopes adjacent to drainageways
• Longmarsh and Zekiah soils on flood plains that are too narrow to be delineated

Management

For general and detailed information about managing this map unit, see the section “Use and Management of the Soils.”

DUD—Downer and Unicorn soils, 10 to 15 percent slopes

Composition

Downer soil and similar soils: 40 percent
Unicorn soil and similar soils: 40 percent
Inclusions: 20 percent

Setting

Landform: Uplands and side slopes
Slope: 10 to 15 percent

Component Description

Downer

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Sandy fluviomarine sediments
Flooding: None
Available water capacity: Low
Note: Gravel deposits on the surface or throughout the profile are common.

Unicorn

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loamy eolian deposits and/or fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Available water capacity: Moderate
Note: Gravel deposits on the surface or throughout the profile are common.

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

• Galestown and Fort Mott soils in landform positions similar to those of the Downer and Unicorn soils
• Longmarsh and Zekiah soils on flood plains that are too narrow to be delineated

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Fallsington Series

The soils of the Fallsington series are very deep and poorly drained. Permeability is moderately slow in the subsoil and moderate to rapid in the substratum. These soils formed in loamy alluvial sediments. They are in low landform positions on uplands. Slopes range from 0 to 2 percent. Fallsington soils are fine-loamy, mixed, mesic Typic Endoaquults.

Fallsington soils are similar to Hurlock and Carmichael soils and are commonly adjacent to Hammonton, Pineyneck, and Corsica soils. The Fallsington soils have more clay in the subsoil than Hurlock and Carmichael soils. They differ from Hammonton and Pineyneck soils in having gray matrix colors in the surface and subsurface layers. The Fallsington soils do not have an umbric epipedon like Corsica soils.

Typical pedon of Fallsington loam; in a wooded area about 2 miles west of the Delaware State line, approximately 1 mile south of Peter's Corners, 0.7 mile southeast of the intersection of Sawmill Road and Templeville-Peter's Corners Road; USGS Sudlersville, Maryland topographic quadrangle; lat. 39 degrees 10 minutes 50 seconds N. and long. 75 degrees 47 minutes 13 seconds W.

A—0 to 5 inches; very dark grayish brown (10YR 3/2) loam; moderate fine granular structure; very friable, slightly sticky, slightly plastic; many very fine and fine and common medium roots; many very fine and fine and few medium irregular pores; strongly acid; abrupt smooth boundary.

Eg—5 to 10 inches; pinkish gray (2.5Y 7/2) sandy loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; many very fine, common fine and medium, and few coarse roots; many very fine and common fine and medium irregular pores; few medium prominent brownish yellow (10YR 6/8) soft iron accumulations; strongly acid; clear smooth boundary.

BEg—10 to 16 inches; light brownish gray (2.5Y 6/2) sandy loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; many very fine and few fine roots; many very fine and common fine tubular pores; common medium distinct yellow (10YR 7/8) soft iron accumulations; common distinct clay films on faces of peds and lining pores; very strongly acid; gradual smooth boundary.

Btg1—16 to 23 inches; light gray (10YR 7/1) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, slightly plastic; common very fine and few fine roots; common very fine and

fine tubular pores; common medium distinct brownish yellow (10YR 6/8) dark gray (10YR 4/1) soft iron accumulations; very strongly acid; clear smooth boundary.

Btg2—23 to 30 inches; light gray (10YR 7/1) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; few very fine and fine roots in pores; common very fine and fine tubular pores; many medium prominent yellowish brown (10YR 5/8) soft iron accumulations; common distinct clay films on faces of peds and lining pores; very strongly acid; gradual smooth boundary.

Btg3—30 to 37 inches; light gray (10YR 7/1) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, slightly plastic; few very fine and fine roots in pores; common very fine and fine tubular pores; common medium prominent yellowish brown (10YR 5/8) soft iron accumulations; common distinct clay films on faces of peds and in pores; very strongly acid; clear wavy boundary.

2BCg—37 to 44 inches; white (5Y 8/2) fine sandy loam; weak medium subangular blocky structure; very friable, slightly sticky, slightly plastic; few very fine and fine roots; few very fine irregular pores; few fine prominent yellowish brown (10YR 5/8) soft iron accumulations; very strongly acid; clear smooth boundary.

2Cg—44 to 62 inches; white (5Y 8/2) loamy fine sand; yellow (10YR 7/6) stratum at depths of 50 to 52 inches; massive; loose, nonsticky, nonplastic; extremely acid; clear wavy boundary.

3Cg—62 to 72 inches; light gray (10YR 7/2) sand; massive; loose, nonsticky, nonplastic; extremely acid.

The thickness of the solum ranges from 24 to 55 inches. Reaction ranges from extremely acid to strongly acid in unlimed areas and from moderately acid to neutral in limed areas. Depth to a seasonal high water table ranges from 0 to 12 inches from January to April.

The A horizon has hue of 10YR to 5Y, value of 3 or 4, and chroma of 1 to 3. Value of 3 only occurs in thin upper A horizons. The horizon is sandy loam, loam, or fine sandy loam.

The Eg or BEg horizon, if it occurs, has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2. It is sandy loam or loam. Redoximorphic features have hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 3 to 8.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 0 to 2. It is sandy clay loam, clay loam, or loam. Redoximorphic features have hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 1 to 8.

The BC or BCb horizon, if it occurs, has hue of 10YR to 5Y, value of 4 to 8, and chroma of 0 to 3. It is commonly sandy loam or sandy clay loam and less commonly fine sandy loam or loam. It has iron accumulations.

The Cg or C horizon has hue of 10YR to 5Y, value of 5 to 8, and chroma of 1 to 3. It ranges from sand to loam and may be stratified with finer textures. Iron accumulations have hue of 7.5YR to 2.5Y and value and chroma of 4 to 8.

Some pedons have an Ab horizon in the substratum. This horizon has hue of 10YR or is neutral in hue, has value of 2 to 5, and has chroma of 0 to 3. It is sandy clay loam or sandy loam.

Fg—Fallsington loam

Composition

Fallsington soil and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Low-lying uplands, depressions, and swales
Slope: 0 to 2 percent

Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Poorly drained
Dominant parent material: Loamy fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Available water capacity: High

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Hammonton and similar soils in the slightly higher landform positions
- Corsica soils in the lower landform positions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Fort Mott Series

The soils of the Fort Mott series are very deep and well drained. Permeability is moderate in the subsoil and rapid in the substratum. These soils formed in sandy alluvial and eolian sediments containing some silts and clays. They are on river terraces and uplands. Slopes range from 0 to 10 percent. Fort Mott soils are loamy, siliceous, mesic Arenic Hapludults.

Fort Mott soils are similar to Downer soils and are commonly adjacent to Downer, Galestown, and Hammonton soils. The Fort Mott soils differ from Downer soils in having thicker, sandier surface and subsurface layers. They have more clay in the B horizon than Galestown soils. They do not have the grayish mottles that are typically of the B horizon of Hammonton soils.

Typical pedon of Fort Mott loamy sand, 0 to 2 percent slopes; near Kingstown, approximately 2,200 feet south along Truslow Road from its intersection with Route 213, approximately 1,500 feet south along a farm lane, on the east side of the lane, in a crop field; USGS Chestertown, Maryland topographic quadrangle; lat. 39 degrees 11 minutes 46 seconds N. and long. 76 degrees 3 minutes 17 seconds W.

Ap—0 to 6 inches; dark yellowish brown (10YR 4/4) loamy sand; moderate medium granular structure; very friable; many very fine, common fine, and few medium roots; many very fine and common fine and medium random tubular pores; neutral; abrupt smooth boundary.

E—6 to 22 inches; yellowish brown (10YR 5/4) loamy sand; weak medium subangular blocky structure; very friable; common very fine and few fine roots; many very fine and common fine irregular pores; slightly acid; clear smooth boundary.

Bt1—22 to 32 inches; dark yellowish brown (10YR 4/6) sandy loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine and few fine roots; many very fine and common fine random tubular pores; clay bridging between sand grains; slightly acid; clear wavy boundary.

Bt2—32 to 40 inches; dark yellowish brown (10YR 4/6) sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine roots; many very fine and common fine random tubular pores; common faint clay films on faces of peds and clay bridging between sand grains; moderately acid; clear wavy boundary.

BC—40 to 60 inches; yellowish brown (10YR 5/8) sandy loam; weak coarse subangular blocky structure; very friable, slightly sticky, nonplastic; few very fine roots; moderately acid; clear wavy boundary.

C1—60 to 68 inches; yellowish brown (10YR 5/6) sandy loam; massive; friable, slightly sticky, slightly plastic; strongly acid; clear wavy boundary.

C2—68 to 72 inches; brownish yellow (10YR 6/6) loamy sand; single grain; loose; few very fine roots; 5 percent coarse fragments 1/4 to 1/2 inch in diameter; moderately acid.

The thickness of the epipedon ranges from 22 to 38 inches. The thickness of the solum ranges from 36 to 60 inches. The content of gravel ranges from 0 to 5 percent in the A horizon, from 0 to 10 percent in the B horizon, and from 0 to 20 percent in the C horizon. Reaction ranges from extremely acid to strongly acid in unlimed areas and from moderately acid to neutral in limed areas.

The Ap horizon has hue of 10YR and value and chroma of 3 or 4. It is loamy sand or sand.

The E horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 6. It is loamy sand or sand.

The BE horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It is loamy sand.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is sandy loam, loam, or sandy clay loam.

The BC horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It is loamy sand or sandy loam.

The C horizon has hue of 10YR, value of 4 to 7, and chroma of 3 to 8. It is sand, loamy sand, or their gravelly analogues. Strata of sandy loam and loamy coarse sand occur in some pedons.

FmA—Fort Mott loamy sand, 0 to 2 percent slopes

Composition

Fort Mott soil and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Stream terraces
Slope: 0 to 2 percent

Component Description

Surface layer texture: Loamy sand
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained

Dominant parent material: Sandy eolian deposits over fluviomarine sediments
Flooding: None
Available water capacity: Moderate

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Ingleside soils in the slightly lower landform positions
- Galestown soils and soils that have sand surface layers more than 40 inches thick; on sandy ridges and in the higher landform positions along drainageways
- Hammonton soils in the lower landform positions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

FmB—Fort Mott loamy sand, 2 to 5 percent slopes

Composition

Fort Mott soil and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Stream terraces and side slopes
Slope: 2 to 5 percent
Note: Slopes are dominantly 2 to 3 percent.

Component Description

Surface layer texture: Loamy sand
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Sandy eolian deposits over fluviomarine sediments
Flooding: None
Available water capacity: Low

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Ingleside soils in the slightly lower landform positions
- Galestown soils and soils that have sandy surface layers more than 40 inches thick; on ridges and in the higher landform positions along drainageways
- Hammonton soils in the lower landform positions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Galestown Series

The soils of the Galestown series are very deep and somewhat excessively drained. Permeability is rapid. These soils formed in sandy alluvial and eolian sediments. They are on uplands of the mid-Atlantic Coastal Plain. Slopes range from 0 to 10 percent. Galestown soils are sandy, siliceous, mesic Psammentic Hapludults.

Galestown soils are commonly adjacent to Downer, Fort Mott, Ingleside, and Sassafras soils. The Galestown soils have less clay in the B horizon than Downer, Fort Mott, Ingleside, and Sassafras soils. They do not have grayish mottles in the substratum that are typical of Ingleside soils.

Typical pedon of Galestown loamy sand in an area of Galestown-Fort Mott loamy sands, 0 to 5 percent slopes; in a cultivated field at Roundtop Wharf along the Chester River, approximately 200 feet north of Roundtop Landing Road, about 1,800 feet north-northwest along that road from its intersection with Roundtop Road; USGS Chestertown, Maryland topographic quadrangle; lat. 39 degrees 13 minutes 45 seconds N. and long. 76 degrees 6 minutes 32 seconds W.

Ap—0 to 10 inches; dark brown (10YR 4/3) loamy sand; weak fine granular structure; very friable; many very fine, common fine, and few medium roots; many very fine and few fine irregular pores; moderately acid; abrupt smooth boundary.

E—10 to 21 inches; yellowish brown (10YR 5/6) loamy sand; weak medium subangular blocky structure; very friable; common very fine and few fine roots; many very fine irregular pores; moderately acid; clear wavy boundary.

Bt—21 to 32 inches; strong brown (7.5YR 5/6) loamy sand; weak medium subangular blocky structure; very friable, slightly plastic; common very fine and few fine roots; many very fine and few fine irregular random tubular pores; many distinct clay films on faces of peds and clay bridging between sand grains; strongly acid; clear wavy boundary.

C1—32 to 45 inches; brownish yellow (10YR 6/8)

sand; single grain; loose; few very fine roots; very strongly acid; clear wavy boundary.
C2—45 to 72 inches; brownish yellow (10YR 6/6) sand; single grain; loose; few thin yellowish brown (10YR 5/6) lamellae; very strongly acid.

The thickness of the solum ranges from 30 to 55 inches. Reaction ranges from extremely acid to strongly acid in unlimed areas and from moderately acid to neutral in limed areas. The content of gravel ranges from 0 to 10 percent in the solum and from 0 to 15 percent in the substratum.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. It is loamy sand or sand.

The E horizon, if it occurs, has hue of 10YR, value of 5 or 6, and chroma of 6. It is loamy sand or sand.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 6 to 8. It is loamy sand or sand. Some Bt horizons consist of thin lamellae exceeding 6 inches in aggregate.

The BC horizon, if it occurs, has colors and textures similar to those of the Bt horizon.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 6 to 8. It is sand or loamy sand or their gravelly analogues above any lithological discontinuity. Some pedons have thin lamellae. Below a depth of 65 inches, texture is variable.

GfB—Galestown-Fort Mott loamy sands, 0 to 5 percent slopes

Composition

Galestown soil and similar soils: 50 percent
Fort Mott soil and similar soils: 35 percent
Inclusions: 15 percent

Setting

Landform: Upland flats and stream terraces
Slope: 0 to 5 percent
Note: Slopes are dominantly 0 to 2 percent.

Component Description

Galestown

Surface layer texture: Loamy sand
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Sandy eolian deposits over fluviomarine sediments
Flooding: None
Available water capacity: Low
Note: Gravel deposits on the surface or throughout the profile are common.

Fort Mott

Surface layer texture: Loamy sand
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Sandy eolian deposits and/or fluviomarine sediments
Flooding: None
Available water capacity: Low
Note: Gravel deposits on the surface or throughout the profile are common.

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Ingleside and similar soils that have a wet substratum; in the lower or flatter landform positions
- Hammonton and similar soils in depressions or swales
- Soils that have surface layers of sand or loamy sand 40 to 80 inches thick

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

GfC—Galestown-Fort Mott loamy sands, 5 to 10 percent slopes

Composition

Galestown soil and similar soils: 50 percent
Fort Mott soil and similar soils: 40 percent
Inclusions: 10 percent

Setting

Landform: Stream terraces and side slopes
Slope: 5 to 10 percent
Note: Slopes are dominantly 5 to 7 percent.

Component Description

Galestown

Surface layer texture: Loamy sand
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Sandy eolian deposits and/or fluviomarine sediments
Flooding: None
Available water capacity: Low

Note: Gravel deposits on the surface or throughout the profile are common.

Fort Mott

Surface layer texture: Loamy sand
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Sandy eolian deposits and/or fluviomarine sediments
Flooding: None
Available water capacity: Low
Note: Gravel deposits on the surface or throughout the profile are common.

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Hammonton and similar soils in depressions and swales
- Soils that have surface layers of sand or loamy sand 40 to 80 inches thick
- Ingleside and similar soils in the lower or flatter landform positions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Greenwich Series

The soils of the Greenwich series are very deep and well drained. Permeability is moderately rapid in the solum and moderately rapid or rapid in the substratum. The soils formed in unconsolidated stratified alluvial and marine sediments capped with a thin veneer of loamy eolian deposits having a high content of silt. They are on level uplands. Slopes range from 0 to 2 percent. Greenwich soils are coarse-loamy, mixed, mesic Typic Hapludults.

Greenwich soils are commonly adjacent to Downer, Hammonton, Ingleside, Pineyneck, Sassafras, and Unicorn soils. Downer and Ingleside soils do not have the loam textures in the solum that are typical of the Greenwich soils. Ingleside and Unicorn soils have a fluctuating seasonal high water table between depths of 48 and 72 inches. Sassafras soils have more clay in the particle-size control section than the Greenwich soils. Pineyneck and Hammonton soils are moderately well drained.

Typical pedon of Greenwich loam, 0 to 2 percent slopes; in a cultivated field east of Ruthsburg, approximately 0.75 mile east along Mason Branch Road from its intersection with Route 304, about 75 feet south of Mason Branch Road; USGS Price, Maryland topographic quadrangle; lat. 39 degrees 7 minutes 14 seconds N. and long. 75 degrees 56 minutes 58 seconds W.

Ap—0 to 12 inches; dark yellowish brown (10YR 4/4) loam; weak coarse granular structure; very friable, slightly sticky, slightly plastic; common very fine and fine roots throughout; few very fine and fine tubular pores; slightly acid; abrupt smooth boundary.

Bt1—12 to 26 inches; strong brown (7.5YR 5/8) loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine and fine roots throughout; few very fine, fine, and medium tubular pores; common distinct patchy yellowish brown (10YR 5/4) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2—26 to 38 inches; strong brown (7.5YR 5/8) loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine and fine roots throughout; common very fine and fine tubular pores and few medium tubular pores; common distinct discontinuous dark yellowish brown (10YR 4/6) clay films on faces of peds and in pores; moderately acid; abrupt wavy boundary.

2BC—38 to 47 inches; strong brown (7.5YR 5/8) loamy sand; weak coarse subangular blocky structure; friable, slightly sticky, nonplastic; few fine and medium roots between peds; few very fine and fine tubular pores; common distinct continuous brown (7.5YR 4/4) clay films on faces of peds; moderately acid; clear wavy boundary.

2C—47 to 60 inches; strong brown (7.5YR 5/6) loamy sand; massive; very friable; 10 percent gravel; moderately acid.

The thickness of the solum ranges from 20 to 55 inches. The silt content in the A horizon, E horizon, and upper part of the Bt horizon ranges from 35 to 60 percent. The content of fine quartzite and chert gravel ranges from 0 to 10 percent in the solum and from 0 to 15 percent in the C horizon. Reaction ranges from extremely acid to strongly acid in unlimed areas and from slightly acid to neutral in heavily limed areas.

The Ap or A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is dominantly loam and less commonly silt loam.

The BE horizon, if it occurs, has hue of 10YR, value of 4 or 5, and chroma of 3 to 8. It is loam.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8. It is loam. The 2Bt horizon, which occurs in many pedons, is similar in color to the Bt horizon but is sandy loam or has thin layers of sandy clay loam.

The 2BC horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 4 to 8. It is commonly sandy loam or loamy sand but may include fine sandy loam or sand.

The 2C horizon has hue of 2.5Y to 5YR, value of 5 to 7, and chroma of 3 to 8. It is commonly stratified with textures of fine sand, sand, or loamy sand but may include thin layers of coarse sand, sandy loam, or sandy clay loam.

GrA—Greenwich loam, 0 to 2 percent slopes

Composition

Greenwich soil and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Upland flats and stream terraces
Slope: 0 to 2 percent

Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loamy eolian deposits and/or fluviomarine sediments
Flooding: None
Available water capacity: Moderate

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

• Ingleside and Unicorn soils in the slightly lower landform positions
• Pineyneck and similar soils in depressions and swales

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Hammonton Series

The soils of the Hammonton series are very deep and moderately well drained. Permeability is moderately rapid in the subsoil and moderate to rapid in the substratum. These soils formed in sandy alluvial coastal plain sediments. They are on uplands and in depressions. Slopes range from 0 to 10 percent. Hammonton soils are coarse-loamy, siliceous, mesic Aquic Hapludults.

Hammonton soils are similar to Pineyneck soils and are commonly adjacent to Fort Mott, Hurlock, Ingleside, and Downer soils. The Hammonton soils have less silt in the solum than Pineyneck soils. They differ from Downer, Ingleside, and Fort Mott soils in having grayish mottles in the B horizon. The Hammonton soils do not have the grayish matrix or mottles that are typical in the surface and subsurface horizons of Hurlock soils.

Typical pedon of Hammonton sandy loam, 0 to 2 percent slopes; 2.2 miles south of Starkey Corner, about 600 feet northeast along Lieby Road from its intersection with Clannihan Shop Road, about 25 feet west of Lieby Road, just south of a swale; USGS Centreville, Maryland topographic quadrangle; lat. 39 degrees 5 minutes 19 seconds N. and long. 76 degrees 0 minutes 52 seconds W.

Ap—0 to 11 inches; brown (10YR 5/3) sandy loam; moderate medium granular structure; friable, slightly sticky; common very fine roots; many very fine, common fine, and few medium irregular pores; neutral; abrupt smooth boundary.

Bt1—11 to 15 inches; olive yellow (2.5Y 6/6) sandy loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine and few fine roots; many very fine and fine and common medium random tubular pores; clay bridging between sand grains; neutral; clear smooth boundary.

Bt2—15 to 24 inches; very pale brown (10YR 7/3) sandy loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine and few fine roots; many very fine and fine and few medium random tubular pores; common medium distinct yellowish brown (10YR 5/6) soft iron accumulations and light gray (10YR 7/2) iron depletions below a depth of 20 inches; common distinct clay films on faces of peds and clay bridging between sand grains; moderately acid; clear wavy boundary.

BC—24 to 42 inches; brownish yellow (10YR 6/6) loamy sand; single grain; loose; few medium distinct light gray (10YR 7/1) iron depletions in pockets; strongly acid; clear wavy boundary.

C1—42 to 52 inches; very pale brown (10YR 7/4) sandy clay loam; massive; firm; few medium distinct light gray (10YR 7/1) iron depletions; strongly acid; clear smooth boundary.
C2—52 to 72 inches; brownish yellow (10YR 6/8) sandy loam; massive; friable; strongly acid.

The thickness of the solum ranges from 25 to 50 inches. Reaction ranges from extremely acid to strongly acid in unlimed areas and from moderately acid to neutral in limed areas. The content of coarse fragments of mixed subrounded gravel ranges from 0 to 5 percent in the solum and from 0 to 25 percent in the C horizon. Depth to a seasonal high water table ranges from 18 to 42 inches from January to April. Depth to the stratified substratum is typically more than 40 inches.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 to 4. It is commonly sandy loam and less commonly loam or fine sandy loam.

The E or BE horizon, if it occurs, has hue of 10YR to 2.5Y, value of 5 to 7, and chroma of 2 to 8. It is commonly sandy loam and less commonly loam or loamy sand.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 6. It is commonly sandy loam. Thin subhorizons of sandy clay loam occur in some pedons. Soft iron accumulations have hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. Iron depletions have hue of 7.5YR or 10YR, value of 6 or 7, and chroma of 1 to 3. Iron depletions with chroma of 2 or less are within 24 inches of the top of the horizon.

The BC or BCg horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 1 to 8. It is commonly sandy loam and less commonly loamy sand or fine sandy loam. It commonly has redoximorphic features.

The C horizon has hue of 7.5YR to 5Y, value of 4 to 7, and chroma of 1 to 8. It is commonly stratified and dominantly loamy sand with strata ranging from sand to sandy clay loam. It commonly has redoximorphic features.

HnA—Hammonton sandy loam, 0 to 2 percent slopes

Composition

Hammonton soil and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Upland flats and shallow depressions
Slope: 0 to 2 percent

Component Description

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Sandy fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Available water capacity: Low

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Ingleside and similar soils in the slightly higher landform positions
- Hurlock and similar soils in depressions and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HnB—Hammonton sandy loam, 2 to 5 percent slopes

Composition

Hammonton soil and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Upland flats and shallow depressions
Slope: 2 to 5 percent
Note: Slopes are dominantly 2 to 3 percent.

Component Description

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Sandy fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Available water capacity: Low

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is

available in the appropriate table of this publication (see "Contents").

Inclusions

- Ingleside and similar soils in the slightly higher landform positions
- Hurlock and similar soils in depressions and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Honga Series

The soils of the Honga series are very deep and very poorly drained. Permeability is slow. These soils formed primarily in moderately decomposed organic deposits from salt-tolerant herbaceous plants overlying loamy mineral sediments having a low *n* value. They are located in brackish submerged upland marshes along tidally influenced bays and tributaries of Chesapeake Bay. Slopes are 0 to 1 percent. Honga soils are loamy, mixed, euic, mesic Terric Sulfihemists.

Honga soils are similar to Bestpitch soils and commonly are adjacent to Whitemarsh and Othello soils. The Honga soils differ from Bestpitch soils in having mineral soil material with an *n* value of less than 0.7 underlying the organic layers. They differ from Whitemarsh and Othello soils in having more than 16 inches of organic deposits overlying mineral sediments.

Typical pedon of Honga peat; on a smooth 0 percent slope, in a submerged upland tidal marsh, approximately 1.3 miles southwest of Grasonville, at Horsehead Wetlands Center, approximately 400 feet east of Prospect Bay shoreline, 150 feet west of an old lodge building, just north of the observation boardwalk; USGS Queenstown, Maryland topographic quadrangle; lat. 38 degrees 57 minutes 7 seconds N. and long. 76 degrees 14 minutes 7 seconds W.

Oi—0 to 12 inches; dark brown (7.5YR 3/2) peat, fibric soil material; fiber content is three-fourths of the soil volume after rubbing; slightly acid; clear smooth boundary.

Oe—12 to 19 inches; black (10YR 2/1) mucky peat, hemic soil material; fiber content is one-third of the soil volume after rubbing; slightly acid; clear smooth boundary.

Ag—19 to 22 inches; very dark gray (5Y 3/1) loam; massive; friable, slightly sticky, nonplastic; *n* value of less than 0.7, material does not flow between the fingers when squeezed; many fine and common medium roots throughout; slightly acid; clear smooth boundary.

Eg—22 to 26 inches; dark gray (5Y 4/1) loam; massive; friable, slightly sticky, slightly plastic; *n* value of less than 0.7, material does not flow between the fingers when squeezed; common fine and very fine roots throughout; neutral; clear smooth boundary.

Btg1—26 to 38 inches; olive gray (5Y 5/2) clay loam; massive; very firm, slightly sticky, plastic; *n* value of less than 0.7, material does not flow between the fingers when squeezed; few fine roots throughout; many fine distinct light olive gray (2.5Y 5/4) soft iron accumulations; neutral; gradual smooth boundary.

Btg2—38 to 50 inches; greenish gray (5GY 5/1) clay loam; massive; friable, slightly sticky, plastic; *n* value of less than 0.7, material does not flow between the fingers when squeezed; common medium prominent light olive brown (2.5Y 5/4 and 5/6) soft iron accumulations; neutral; clear smooth boundary.

BCg—50 to 60 inches; gray (N 6/0) sandy clay loam; massive; friable, slightly sticky, slightly plastic; *n* value of less than 0.7, material does not flow between the fingers when squeezed; many medium prominent light olive brown (2.5Y 5/4 and 5/6) soft iron accumulations; neutral; clear smooth boundary.

Cg—60 to 72 inches; stratified greenish gray (5GY 5/1) clay loam and gray (5Y 6/1) sandy loam; massive; friable, slightly sticky, plastic; *n* value of less than 0.7, material does not flow between the fingers when squeezed; few fine prominent light olive brown (2.5Y 5/4 and 5/6) and common medium prominent yellowish brown (10YR 5/6) soft iron accumulations; neutral.

The thickness of the organic deposits ranges from 16 to 45 inches. Reaction ranges from slightly acid to slightly alkaline in the soil's natural state. It can range from extremely acid to strongly acid upon drying the soil. The total sulfur content of the organic horizons ranges from 0.75 to 3.0 percent. The total sulfur content of the mineral horizons ranges from 0.05 to 0.50 percent. Conductivity of the saturation extract of the organic horizons ranges to more than 16 millimhos per centimeter. Conductivity of the saturation extract of the mineral horizons typically ranges from 4 to 16 millimhos per centimeter but can range to greater than 16 millimhos per centimeter. Mineral horizons typically have an *n* value that is less than 0.7 but ranges from 1.0 to less than 0.7.

The surface tier has hue of 7.5YR or 10YR, value of

3, and chroma of 1 or 2. It is fibric or hemic soil material.

The subsurface tier has hue of 7.5YR or 10YR, value of 2 to 5, and chroma of 0 to 3. It is hemic or sapric soil material. The fiber content after rubbing ranges from one-tenth to one-half of the soil volume.

The bottom tier has hue of 7.5YR to 5Y, value of 2, and chroma of 0 or 1. It is hemic or sapric soil material.

In most pedons the subsurface and bottom tiers include the mineral horizons.

The Ag horizon has hue of 10YR to 5Y, value of 2 to 5, and chroma of 1 or 2. It is commonly loam or mucky loam and less commonly mucky silt loam or sandy loam.

The Eg or BEg horizon, if it occurs, has hue of 10YR or 5Y, value of 4 or 5, and chroma of 1. It is commonly loam and less commonly fine sandy loam. Iron accumulations occur in some pedons.

The Btg horizon has hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 0 to 2. It is clay loam, silt loam, silty clay loam, or loam. Iron accumulations have hue of 10YR, 2.5Y, or 5Y and value and chroma of 4 or 6.

The BCg horizon, if it occurs, has hue of 10YR to 5Y, value of 2 to 6, and chroma of 0 to 2. It is sandy loam or stratified with finer textures. Iron accumulations have hue of 10YR to 5Y, value of 4 or 5, and chroma of 3 to 6.

The Cg or C horizon has hue of 10YR to 5BG, value of 4 to 6, and chroma of 0 to 4. Matrix colors may change upon exposing the soil to air. The horizon is sandy loam stratified with clay loam, loam, silt loam, or loamy sand. Iron accumulations have hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 to 6. Iron depletions have hue of 10YR or 5Y, value of 6, and chroma of 1 or 2.

Ho—Honga peat

Composition

Honga soil and similar soils: 80 percent
Inclusions: 20 percent

Setting

Landform: Submerged upland tidal marshes
Slope: 0 to 1 percent
Note: Natural vegetation is currently dominated by needlerush, saltmeadow cordgrass, saltmarsh (smooth) cordgrass, saltgrass, marshelder, and eastern baccharis (groundsel tree). This map unit is best suited to habitat for wetland wildlife. The vegetation and soil provide suitable habitat for the feeding and nesting of waterfowl and muskrats. The soil is a valuable storage medium for the retention of nutrients (nitrogen and phosphorus), floodwaters, sediment, and potential pollutants.

Component Description

Surface layer texture: Peat
Depth class: Very deep (more than 60 inches)
Drainage class: Very poorly drained
Dominant parent material: Organic deposits over fluviomarine sediments
Flooding: Frequent
Kind of water table: Apparent
Ponding: Brief
Salt affected: Saline within a depth of 30 inches
Available water capacity: Very high
Note: Reaction becomes extremely acid to strongly acid upon drying the soil. There is a moderate or severe erosion hazard by water along drainageways and coastlines. The load-bearing capacity is very low in the organic layers and low in the mineral substratum. The content of reduced sulfur compounds is high in the organic layers and moderate in the mineral substratum.

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Bestpitch soils along large meandering tidal creeks
- Very poorly drained soils that have an organic surface layer that is thinner than that of the Honga soil
- Areas of open water, such as salt pannes and meandering tidal creeks

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Hurlock Series

The soils of the Hurlock series are very deep and poorly drained. Permeability is moderately rapid. These soils formed in unconsolidated, stratified alluvial and marine sediments. They are on low-lying uplands, in broad depressions, and on narrow flood plains. Slopes range from 0 to 2 percent. Hurlock soils are coarse-loamy, siliceous, mesic Typic Endoaquults.

Hurlock soils are similar to Fallsington and Carmichael soils and commonly are adjacent to Hammonton, Pineyneck, Ingleside, and Unicorn soils.

The Hurlock soils have less clay in the subsoil than Fallsington soils and less silt than Carmichael soils. They differ from Hammonton, Pineyneck, Ingleside, and Unicorn soils in having a gray matrix or grayish mottles in the surface and subsurface layers.

Typical pedon of Hurlock sandy loam; in a crop field south of the town of Barclay, 0.75 mile south along Route 313 from its intersection with Route 302, about 250 feet east of Route 313; USGS Sudlersville, Maryland topographic quadrangle; lat. 39 degrees 8 minutes 1 second N. and lat. 75 degrees 51 minutes 51 seconds W.

Ap—0 to 10 inches; dark gray (10YR 4/1) sandy loam; weak fine granular structure; very friable, slightly sticky, slightly plastic; many very fine, fine, and medium roots; common very fine and fine irregular pores; slightly acid; abrupt smooth boundary.

Btg1—10 to 15 inches; light gray (10YR 7/1) sandy loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine and fine and few medium roots; many very fine and common fine tubular pores; common fine distinct brownish yellow (10YR 6/8) iron accumulations; common faint and distinct clay films on faces of peds and clay bridging between sand grains; slightly acid; gradual wavy boundary.

Btg2—15 to 23 inches; light gray (10YR 7/1) sandy loam; moderate medium subangular blocky structure; firm, slightly sticky, slightly plastic; common very fine and fine and few medium roots; many very fine and common fine tubular pores; common coarse distinct brownish yellow (10YR 6/8) iron accumulations; common faint and distinct clay films on faces of peds; slightly acid; clear smooth boundary.

BCg—23 to 31 inches; light gray (10YR 7/1) and gray (10YR 5/1) sandy loam; weak medium subangular blocky structure; friable, slightly sticky; common very fine and few medium and fine roots; many very fine irregular pores; common medium distinct brownish yellow (10YR 6/8) iron accumulations; faint clay bridging between sand grains; slightly acid; clear smooth boundary.

Cg1—31 to 54 inches; light brownish gray (2.5Y 6/2) loamy coarse sand; single grain; loose; few very fine and fine roots; slightly acid; clear wavy boundary.

Cg2—54 to 72 inches; white (N 8/0) loamy coarse sand; single grain; loose; few very fine roots; slightly acid.

The thickness of the solum ranges from 20 to 45 inches. The content of gravel ranges from 0 to 5 percent in the solum and from 0 to 15 percent in the substratum. A seasonal high water table occurs between the soil surface and a depth of 12 inches from December to May. Reaction ranges from extremely acid to strongly acid in unlimed areas and from slightly acid to neutral in heavily limed areas.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 1 or 2. Value of 2 or 3 only occurs in thin upper A horizons. The horizon is sandy loam or loam.

The Eg horizon, if it occurs, has hue of 10YR to 2.5Y, value of 4 to 7, and chroma of 1 or 2. Iron accumulations with hue of 10YR, value of 5 or 6, and chroma of 4 to 6 commonly occur. The horizon is sandy loam. In some pedons the A and E horizons have been mixed by plowing.

The Btg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. Iron accumulations have value of 4 to 6 and chroma of 4 to 8. The horizon is commonly sandy loam, but some pedons have thin layers of sandy clay loam or loam.

The BCg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. It is sandy loam or loamy sand.

The Cg horizon is neutral in hue or has hue of 10YR to 5Y, has value of 4 to 8, and has chroma of 0 to 2. Iron accumulations and depletions commonly occur. The horizon is loamy sand, loamy coarse sand, or sand with strata of finer textures in the lower part.

The C horizon, if it occurs, has hue of 2.5YR to 10YR, value of 5 to 8, and chroma of 6 to 8. It commonly has iron accumulations and depletions. It is loamy sand or sandy loam and is commonly stratified with thin horizontal bands of finer textures.

The 2Cg horizon, if it occurs, is neutral in hue or has hue of 10YR to 5Y, has value of 5 to 7, and has chroma of 0 to 2. Stratified textures range from very fine sandy loam to silty clay loam.

Some pedons have a buried A horizon, which has a high content of organic matter.

Hr—Hurlock sandy loam

Composition

Hurlock soil and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Upland flats, depressions, and swales
Slope: 0 to 2 percent

Component Description

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)

Drainage class: Poorly drained
Dominant parent material: Sandy fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Available water capacity: Moderate

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Hammonton and similar soils in the higher landform positions
- Corsica soils in the lower landform positions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Ingleside Series

The soils of the Ingleside series are very deep and well drained. Permeability is moderately rapid or rapid in the solum and moderate or moderately rapid in the 2C horizon. These soils formed in unconsolidated stratified alluvial and marine sediments. They are on uplands, side slopes, and ancient alluvial terraces. Slopes range from 0 to 10 percent. Ingleside soils are coarse-loamy, siliceous, mesic Typic Hapludults.

Ingleside soils are commonly adjacent to Downer, Fort Mott, Galestown, Hammonton, and Unicorn soils. The Ingleside soils differ from Downer, Fort Mott, and Galestown soils in having grayish mottles, which are indicative of a seasonal high water table, in the substratum. They do not have the grayish mottles that are typical of the subsoil of Hammonton soils. The Ingleside soils have less silt in the solum than Unicorn soils.

Typical pedon of Ingleside sandy loam, 2 to 5 percent slopes; about 1,800 feet southeast of the Chester River, in a grassy area west of the pond, 1,800 feet northwest along Spaniard's Neck Road from its intersection with Land's End Road, 1,900 feet northwest along a farm lane, about 400 feet northeast of the farm lane; USGS Centreville, Maryland topographic quadrangle; lat. 39 degrees 6 minutes 15 seconds N. and long. 76 degrees 6 minutes 22 seconds W.

Ap—0 to 10 inches; dark yellowish brown (10YR 4/4) sandy loam; weak fine granular structure; very friable, slightly sticky, slightly plastic; common very fine and many fine and medium roots; many fine and very fine interstitial pores; moderately acid; clear smooth boundary.

E—10 to 15 inches; yellowish brown (10YR 5/6) loamy sand; weak medium subangular blocky structure; friable, slightly sticky, nonplastic; many fine, common very fine, and few medium roots; common very fine and fine and few medium interstitial pores; neutral; clear smooth boundary.

Bt1—15 to 25 inches; brown (7.5YR 4/4) sandy loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine and fine roots; many very fine and common fine interstitial pores; common faint clay films on faces of peds and many distinct clay bridges and coatings on sand grains; neutral; clear wavy boundary.

Bt2—25 to 38 inches; brown (7.5YR 4/4) sandy loam; weak medium subangular blocky structure; friable, slightly sticky, nonplastic; common very fine and fine roots; many very fine and common fine interstitial pores; common faint clay films on faces of peds, few distinct clay films in pores, and many distinct clay bridges and coatings on sand grains; neutral; clear wavy boundary.

BC—38 to 43 inches; strong brown (7.5YR 5/6) loamy sand; few thin strata of light yellowish brown (10YR 6/4) sandy loam and reddish yellow (7.5YR 6/8) sand; massive; firm, slightly sticky, nonplastic; few fine and very fine roots; common very fine and fine interstitial pores; common faint clay bridges between sand grains; neutral; clear smooth boundary.

C/B—43 to 59 inches; brownish yellowish (10YR 6/8) sand; massive; very friable; eight reddish brown (5YR 4/4) lamellae 1 to 3 millimeters thick and brownish yellow (10YR 6/6) E material; few fine and very fine roots; many very fine interstitial pores; neutral; abrupt smooth boundary.

2C—59 to 72 inches; pale brown (2.5Y 6/3) sandy loam and loam; massive; firm, slightly sticky, slightly plastic; few fine roots; common very fine and fine tubular pores; common medium faint light brownish gray (2.5Y 6/2) iron depletions and common medium prominent strong brown (7.5YR 5/8) iron accumulations; neutral.

The thickness of the solum ranges from 25 to 50 inches. The content of fine gravel ranges from 0 to 10 percent in the solum and from 0 to 25 percent in the C horizon. Reaction ranges from extremely acid to strongly acid in unlimed areas and from slightly acid to neutral in heavily limed areas. Depth to a seasonal high water table ranges from 48 to 72 inches from

January to May. Depth to mottling also ranges from 48 to 72 inches.

The Ap or A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. It is sandy loam or loamy sand.

The E horizon has hue of 10YR, value of 5 or 6, and chroma of 3 to 6. It is sandy loam or loamy sand. In some pedons the A and E horizons have been mixed by plowing.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is commonly sandy loam, but some pedons have thin layers of sandy clay loam or loam.

The BC horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 4 to 8. It is loamy sand or sandy loam and, in some areas, is stratified with finer textures. Lamellae with high chroma occur in some areas.

The C horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 4 to 8. It is sand or loamy sand and is commonly stratified with finer textures. Iron accumulations and depletions commonly occur in the lower part of the horizon. Some pedons have a Cg or 2Cg horizon.

IgA—Ingleside sandy loam, 0 to 2 percent slopes

Composition

Ingleside soil and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Upland flats and stream terraces
Slope: 0 to 2 percent

Component Description

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Sandy eolian deposits and/ or fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Available water capacity: Moderate
Note: Depth to the seasonal high water table ranges from 42 to 72 inches.

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Greenwich, Downer, and Sassafras soils in the slightly higher landform positions
- Hammonton and similar soils in the slightly lower landform positions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

IgB—Ingleside sandy loam, 2 to 5 percent slopes

Composition

Ingleside soil and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Upland flats, knolls, side slopes, and stream terraces
Slope: 2 to 5 percent
Note: Slopes are dominantly 2 to 3 percent.

Component Description

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Sandy eolian deposits and/ or fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Available water capacity: Moderate
Note: Gravel deposits on the surface or throughout the profile are common, especially in areas where elevations are between 40 and 60 feet. Depth to the seasonal high water table ranges from 42 to 72 inches.

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Downer, Sassafras, and Greenwich soils in the slightly higher landform positions

• Hammonton and similar soils in the slightly lower landform positions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

IgC—Ingleside sandy loam, 5 to 10 percent slopes

Composition

Ingleside soil and similar soils: 80 percent
Inclusions: 20 percent

Setting

Landform: Uplands and side slopes
Slope: 5 to 10 percent
Note: Slopes are dominantly 5 to 7 percent.

Component Description

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Sandy eolian deposits and/or fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Available water capacity: Low
Note: Gravel deposits on the surface or throughout the profile are common, especially in areas where elevations are between 40 and 60 feet. Depth to the seasonal high water table ranges from 42 to 72 inches.

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

• Downer, Sassafras, and Greenwich soils in the slightly higher landform positions
• Hammonton and similar soils in the slightly lower landform positions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Kentuck Series

The soils of the Kentuck series are very deep and very poorly drained. Permeability is slow in the solum. These soils formed in woody organic deposits overlying unconsolidated, eolian, alluvial, or marine sediments. They are in depressions and on ancient flood plains. Slopes range from 0 to 2 percent. Kentuck soils are fine-silty, mixed, mesic Typic Umbraquults.

Kentuck soils are similar to Corsica soils and are commonly adjacent to Whitemarsh and Othello soils. The Kentuck soils have less sand in the control section than Corsica soils. They differ from Whitemarsh and Othello soils in having a thick, black, highly organic surface layer more than 10 inches thick.

Typical pedon of Kentuck mucky silt loam; on a smooth 0 percent slope, in a circular depression in woods, about 3,200 feet southwest of the intersection of Granny Branch Road and Clannihan Shop Road, 250 feet west into the woods from the field edge; USGS Price, Maryland topographic quadrangle; lat. 39 degrees 5 minutes 3 seconds N. and long. 75 degrees 59 minutes 17 seconds W.

Oi/Oe—0 to 2 inches; undecomposed and moderately decomposed leaves and twigs; clear smooth boundary.

A—2 to 10 inches; black (10YR 2/1) mucky silt loam; moderate fine granular structure; very friable, slightly sticky, slightly plastic; many very fine and fine and common medium and coarse roots; many very fine and fine and common medium irregular pores; high organic matter content; extremely acid; clear wavy boundary.

Eg—10 to 14 inches; gray (10YR 5/1) silt loam; weak medium subangular blocky structure; very friable, slightly sticky, slightly plastic; common very fine and fine and few medium roots; many very fine, common fine, and few medium tubular pores; few fine prominent strong brown (7.5YR 5/6) iron accumulations; very strongly acid; clear wavy boundary.

Btg1—14 to 25 inches; gray (10YR 6/1) silty clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common very fine and fine and few medium roots; many very fine, common fine, and few medium tubular pores; few medium distinct dark brown (7.5YR 4/4) and brownish yellow (10YR 6/6) iron accumulations and common medium faint gray (10YR 5/1) iron depletions; common faint clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btg2—25 to 44 inches; light gray (10YR 7/1) silt loam; moderate medium subangular blocky structure; firm, slightly sticky, plastic; few very fine and fine

roots; common very fine and fine tubular pores; few fine distinct strong brown (7.5YR 5/8) and few medium distinct yellowish brown (10YR 5/6) iron accumulations; common distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

Cg1—44 to 65 inches; light gray (2.5Y 7/1) silt loam; massive; very friable, slightly sticky; few very fine and fine roots; many very fine tubular pores; common medium and few fine distinct yellowish brown (10YR 5/8) iron accumulations; strongly acid; gradual wavy boundary.

Cg2—65 to 72 inches; gray (N 6/0) silty clay loam; massive; firm, sticky, plastic; few very fine roots; strongly acid.

The thickness of the solum ranges from 30 to 56 inches. The thickness of the umbric horizon ranges from 10 to 22 inches. Reaction ranges from extremely acid to strongly acid in unlimed areas and from slightly acid to neutral in limed areas. A seasonal high water table ranges from 6 inches above the soil surface to 6 inches below the soil surface from December to June.

The A horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2. It is mucky silt loam or silt loam.

The Eg horizon, if it occurs, has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is silt loam.

The Btg horizon has hue of 10YR to 5Y, value of 3 to 7, and chroma of 1 or 2. It is silt loam or silty clay loam.

The BCg horizon, if it occurs, has hue of 10YR to 5Y, value of 4 or 6, and chroma of 1 or 2. It commonly has iron accumulations with hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 8. It is silt loam or loam.

The 2BCg horizon, if it occurs, has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2. It is loam, sandy loam, or fine sandy loam.

The Cg horizon, if it occurs, has hue of 10YR to 5Y, value of 4 to 6, and chroma of 0 to 2. It is silt loam or silty clay loam.

The 2Cg horizon, if it occurs, has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 to 4. It is sand, fine sand, or loamy sand with pockets of finer textured material.

Kn—Kentuck mucky silt loam

Composition

Kentuck soil and similar soils: 80 percent
Inclusions: 20 percent

Setting

Landform: Delmarva bays
Slope: 0 to 2 percent
Note: Most areas of this soil are used as woodland and wildlife habitat. Some small areas have been drained and are used as cropland. The natural vegetation and soil provide suitable habitat for the feeding and nesting of small mammals, amphibians, reptiles, and waterfowl. The soil is a valuable storage medium for the retention of nutrients (nitrogen and phosphorus), floodwaters, sediment, and potential pollutants.

Component Description

Surface layer texture: Mucky silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Very poorly drained
Dominant parent material: Silty eolian deposits and/or fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Ponding: Very long
Available water capacity: High

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Unnamed soils that have thick organic surface layers and mineral substrata or mineral soils that have organic surface layers; in the slightly lower pockets
- Puckum soils intermingled in the slightly lower pockets
- Pineyneck and similar soils on narrow ridges surrounding circular depressions
- Whitemarsh and similar soils in the slightly higher landform positions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Longmarsh Series

The soils of the Longmarsh series are very deep and very poorly drained. Permeability is moderately rapid or rapid. These soils formed in loamy alluvium over sandy and gravelly coastal plain sediments. They are on flood plains. Slopes range from 0 to 2 percent.

Longmarsh soils are coarse-loamy, siliceous, acid, mesic Fluvaquentic Humaquepts.

Longmarsh soils are similar to Zekiah soils and are commonly adjacent to Corsica, Hurlock, Kentuck, Othello, and Whitemarsh soils. Corsica and Kentuck soils have an argillic horizon. Hurlock, Othello, and Whitemarsh soils are poorly drained and have argillic horizons. Zekiah soils are poorly drained and do not have an umbric epipedon.

Typical pedon of Longmarsh mucky loam, 0 to 1 percent slopes; approximately 1 mile southeast of the town of Hope, approximately 600 feet southwest of the Devers Branch Road bridge over the German Branch; USGS Price, Maryland topographic quadrangle; lat. 39 degrees 0 minutes 51 seconds N. and long. 75 degrees 56 minutes 50 seconds W.

Oi—0 to 0.5 inch; slightly decomposed leaves and twigs.

Oe—0.5 to 1 inch; moderately decomposed organic materials.

A1—1 to 7 inches; black (10YR 2/1) mucky loam; weak medium subangular blocky structure parting to weak medium granular; very friable, nonsticky, slightly plastic; many very fine to coarse roots throughout; few fine discontinuous tubular pores; very strongly acid; gradual smooth boundary.

A2—7 to 19 inches; very dark gray (7.5YR 3/1) mucky sandy loam; weak coarse subangular blocky structure; very friable, nonsticky, slightly plastic; many very fine to coarse roots throughout; few fine discontinuous tubular pores; strongly acid; clear smooth boundary.

Cg1—19 to 34 inches; grayish brown (2.5Y 5/2) fine sandy loam; massive; firm, nonsticky, slightly plastic; common coarse distinct dark grayish brown (10YR 4/2) organic stains around old roots; common very fine and fine roots throughout; a layer of gray (10YR 4/1) loamy sand between depths of 22 and 24 inches; strongly acid; gradual smooth boundary.

Cg2—34 to 54 inches; light gray (2.5Y 7/2) loamy sand; massive; loose; 2 percent fine mixed gravel; strongly acid; gradual smooth boundary.

Cg3—54 to 66 inches; stratified 60 percent light brownish gray (2.5Y 6/2) and 40 percent grayish brown (2.5Y 5/2) loamy sand; massive; loose; strongly acid.

The thickness of the umbric epipedon ranges from 10 to 22 inches. The content of organic matter ranges from 5 to 18 percent in the A horizon. In the substratum it is variable and ranges from 1 to 10 percent. The content of coarse fragments of mixed rounded gravel ranges from 0 to 15 percent in the A horizon and from 0 to 35 percent in the substratum.

The A horizon has hue of 7.5YR to 5Y, value of 2 to 4, and chroma of 0 to 2. It is mucky sandy loam, mucky loam, sandy loam, or loam, but texture can include sand, loamy sand, silt loam, or fine sandy loam.

The Cg horizon has hue of 10YR to 5Y, value of 3 to 8, and chroma of 1 or 2. It is commonly loamy sand, fine sandy loam, or coarse sand, but texture can include sand, loamy coarse sand, or sandy loam or their gravelly analogues. Iron accumulations and depletions, if they occur, have hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 6.

The C horizon, if it occurs, has hue of 7.5YR to 5Y, value of 4 to 6, and chroma of 3 to 6. This horizon occurs in a reduced environment despite the high chroma. It is clay loam, loamy sand, or sand. Iron depletions and accumulations may occur.

Lo—Longmarsh mucky loam, 0 to 1 percent slopes

Composition

Longmarsh soil and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Flood plains
Slope: 0 to 1 percent
Note: Most areas of this map unit are used as woodland and wildlife habitat. The natural vegetation and soil provide suitable habitat for the feeding and nesting of small mammals, amphibians, reptiles, and waterfowl. The soil is a valuable storage medium for the retention of nutrients (nitrogen and phosphorus), floodwaters, sediment, and potential pollutants.

Component Description

Surface layer texture: Mucky loam
Depth class: Very deep (more than 60 inches)
Drainage class: Very poorly drained
Dominant parent material: Loamy alluvial sediments
Flooding: Frequent
Kind of water table: Apparent
Ponding: Brief
Available water capacity: Moderate

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is

available in the appropriate table of this publication (see "Contents").

Inclusions

- Puckum soils and unnamed mineral soils that have thick organic surface layers; in depressions or old oxbows
- Zekiah soils in the slightly higher landform positions
- Fallsington and similar soils on adjacent low flats
- Moderately well drained soils on sandbars and points

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

LZ—Longmarsh and Zekiah soils, 0 to 2 percent slopes

Composition

Longmarsh soil and similar soils: 40 percent
Zekiah soil and similar soils: 40 percent
Inclusions: 20 percent

Setting

Landform: Flood plains
Slope: 0 to 2 percent
Note: Most areas of this map unit are used as woodland and wildlife habitat. The natural vegetation and soil provide suitable habitat for the feeding and nesting of small mammals, amphibians, reptiles, and waterfowl. These soils are a valuable storage medium for the retention of nutrients (nitrogen and phosphorus), floodwaters, sediment, and potential pollutants (fig. 5).

Component Description

Longmarsh

Surface layer texture: Mucky loam
Depth class: Very deep (more than 60 inches)
Drainage class: Very poorly drained
Dominant parent material: Loamy alluvial sediments
Flooding: Frequent
Kind of water table: Apparent
Ponding: Brief
Available water capacity: Moderate

Zekiah

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Poorly drained
Dominant parent material: Loamy alluvial sediments
Flooding: Frequent
Kind of water table: Apparent
Available water capacity: Moderate

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Hurlock and similar soils on adjacent low flats
- Corsica and similar soils on old oxbows that were cut off from the main flood plain
- Puckum soils in depressions and old stream channels

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Matapeake Series

The soils of the Matapeake series are very deep and well drained. Permeability is moderately slow or moderate. These soils formed in silty eolian or alluvial sediments and the underlying alluvial sediments. They are on upland flats. Slopes range from 0 to 10 percent. Matapeake soils are fine-silty, mixed, mesic Typic Hapludults.

Matapeake soils are commonly adjacent to Butlertown, Mattapex, Nassawango, and Othello soils. The Matapeake soils do not have the grayish mottles that typically occur in the solum of Mattapex and Othello soils and in the substratum of Nassawango soils. Butlertown soils have a fragipan which the Matapeake soils do not.

Typical pedon of Matapeake silt loam, 2 to 5 percent slopes; northeast of Centreville, approximately 1.3 miles east along White Marsh Road from Route 213, about 0.5 mile south of White Marsh Road along a farm lane, about 20 feet west of the lane; USGS Centreville, Maryland topographic quadrangle; lat. 39 degrees 3 minutes 52 seconds N. and long. 76 degrees 1 minute 31 seconds W.

Ap—0 to 10 inches; brown (10YR 5/3) silt loam; weak fine subangular blocky structure; friable, slightly sticky, nonplastic; common very fine and fine and few medium roots; common very fine and fine and few medium tubular pores; slightly acid; abrupt smooth boundary.

Figure 5.—An area of Longmarsh and Zekiah soils, 0 to 2 percent slopes, on a flood plain provides a valuable storage medium for floodwaters, nutrients, sediment, and potential pollutants.

Bt1—10 to 19 inches; yellowish brown (10YR 5/4) silt loam; weak medium prismatic structure parting to moderate medium subangular blocky; firm, slightly sticky, slightly plastic; common very fine and fine and few medium roots; common very fine and fine interstitial pores; common prominent brown (7.5YR 5/4) clay films on faces of peds; slightly alkaline; clear smooth boundary.

Bt2—19 to 32 inches; yellowish brown (10YR 5/6) silt loam; few medium distinct light yellowish brown (10YR 6/4) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm, slightly sticky, slightly plastic; few very fine and fine roots in cracks; common very fine and fine interstitial and few medium tubular pores; common distinct brown (7.5YR 5/4) clay films on faces of peds; slightly alkaline; gradual smooth boundary.

Bt3—32 to 41 inches; yellowish brown (10YR 5/6) silt loam; few fine and medium distinct yellowish red (5YR 5/8) and common medium distinct light yellowish brown (10YR 6/4) and pale brown (10YR 6/3) mottles; weak coarse prismatic structure parting to weak medium platy; firm, slightly sticky,

slightly plastic; few fine and medium roots in cracks; common very fine and many fine interstitial pores; common prominent brown (10YR 4/3) clay films on faces of peds; slightly alkaline; clear smooth boundary.

Bt4—41 to 47 inches; yellowish brown (10YR 5/4) silt loam; few fine distinct light yellowish brown (10YR 6/4) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable, slightly sticky, slightly plastic; few fine roots in cracks; common very fine and fine interstitial pores; common prominent brown (10YR 4/3) clay films on faces of peds and in pores; slightly alkaline; clear wavy boundary.

2BC—47 to 62 inches; yellowish brown (10YR 5/4) loam; weak medium subangular blocky structure; firm, slightly sticky, slightly plastic; common very fine and fine interstitial and few medium tubular pores; few faint brown (7.5YR 5/4) clay films on faces of peds; slightly alkaline; clear smooth boundary.

2C—62 to 72 inches; yellowish brown (10YR 5/6) sandy loam; few medium distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine interstitial pores; slightly alkaline.

The thickness of the solum, excluding the 2BC horizon, ranges from 30 to 60 inches. Depth to a seasonal high water table is more than 72 inches. Reaction ranges from extremely acid to strongly acid in unlimed areas and from moderately acid to neutral in limed areas.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. It is silt loam.

The E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 to 6. It is silt loam.

The Bt horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6. It is silt loam or silty clay loam. The lower part of the Bt horizon (or 2Bt horizon) may include textures of loam. Mottling in the Bt horizon, in some pedons, is due to reduction and oxidation for short periods of time because of water tension films on structural peds. The high water table does not occur in this horizon.

The 2BC horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. It is loam, sandy loam, or fine sandy loam. The content of rock fragments ranges from 0 to 15 percent, by volume.

The 2C horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 3 to 8. It is sandy loam, loamy sand, sand, or loamy fine sand and is commonly stratified with finer textures. The content of rock fragments ranges from 0 to 15 percent.

MkA—Matapeake silt loam, 0 to 2 percent slopes

Composition

Matapeake soil and similar soils: 80 percent
Inclusions: 20 percent

Setting

Landform: Uplands
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Silty eolian deposits and/or fluviomarine sediments
Flooding: None
Available water capacity: Very high

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Butlertown soils in the lower landform positions
- Nassawango soils in the lower landform positions
- Mattapex soils in the lower landform positions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MkB—Matapeake silt loam, 2 to 5 percent slopes

Composition

Matapeake soil and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Uplands and side slopes
Slope: 2 to 5 percent
Note: Slopes are dominantly 2 to 3 percent.

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained

Dominant parent material: Silty eolian deposits and/or fluviomarine sediments
Flooding: None
Available water capacity: Very high

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see “Contents”).

Inclusions

- Sassafras soils in landform positions similar to those of the Matapeake soil
- Butlertown soils in the lower landform positions
- Mattapex soils in the lower landform positions
- Nassawango soils in the slightly lower landform positions

Management

For general and detailed information about managing this map unit, see the section “Use and Management of the Soils.”

MkC—Matapeake silt loam, 5 to 10 percent slopes

Composition

Matapeake soil and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Uplands and side slopes
Slope: 5 to 10 percent
Note: Slopes are dominantly 5 to 7 percent.

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Silty eolian deposits and/or fluviomarine sediments
Flooding: None
Available water capacity: Very high

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see “Contents”).

Inclusions

- Nassawango and similar soils in the slightly lower landform positions
- Pineyneck and similar soils in the lower landform positions

Management

For general and detailed information about managing this map unit, see the section “Use and Management of the Soils.”

Mattapex Series

The soils of the Mattapex series are very deep and moderately well drained. Permeability is moderately slow or moderate. These soils formed in silty eolian or alluvial sediments and underlying sandy alluvial sediments. They are on low upland flats, in slight swales, and in depressions. Slopes range from 0 to 10 percent. Mattapex soils are fine-silty, mixed, mesic Aquic Hapludults.

Mattapex soils are similar to Butlertown soils and are commonly adjacent to Matapeake and Othello soils. The Mattapex soils do not have the grayish mottles that typically occur in the surface and subsurface layers of Othello soils. They differ from Butlertown soils in having grayish mottles in the lower solum and in not having a fragipan. The Mattapex soils differ from Matapeake soils in having grayish mottles in the B horizon.

Typical pedon of Mattapex silt loam in an area of Mattapex-Butlertown silt loams, 2 to 5 percent slopes; in a crop field on Kent Island, approximately 1.25 miles southeast along Batts Neck Road from its intersection with Route 8, approximately 0.6 mile south of Batts Neck Road, about 150 feet west of a small drainageway; USGS Kent Island, Maryland topographic quadrangle; lat. 38 degrees 55 minutes 10.3 seconds N. and long. 76 degrees 19 minutes 34.3 seconds W.

Ap—0 to 12 inches; yellowish brown (10YR 5/4) silt loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; many very fine and common fine roots; many very fine and few fine and medium random tubular pores; neutral; abrupt wavy boundary.

Bt1—12 to 20 inches; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine and few fine roots; many very fine, common fine, and few medium random tubular pores; few faint clay films on faces of peds; neutral; clear wavy boundary.

Bt2—20 to 28 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic;

many very fine, common fine, and few medium random tubular pores; common medium distinct pale brown (10YR 6/3) and few medium prominent light gray (10YR 7/2) iron depletions; few distinct clay films on faces of peds and lining pores; strongly acid; clear smooth boundary.

Btg—28 to 37 inches; light brownish gray (2.5Y 6/2) silt loam; moderate medium subangular blocky structure; firm, slightly sticky, slightly plastic; many very fine, common fine, and few medium random tubular pores; common medium prominent yellowish brown (10YR 5/6) and few medium distinct strong brown soft iron accumulations; few distinct clay films on faces of peds and lining pores; strongly acid; clear wavy boundary.

2BCg—37 to 45 inches; light brownish gray (2.5Y 6/2) fine sandy loam; few medium prominent light brown (7.5YR 6/3) mottles; moderate coarse subangular blocky structure; firm, nonsticky, slightly plastic; many very fine and few fine random tubular pores; common medium prominent yellowish brown (10YR 5/6) soft iron accumulations; common distinct clay films on faces of peds and lining pores; very strongly acid; clear smooth boundary.

2Cg1—45 to 58 inches; light gray (2.5Y 7/2) fine sandy loam; few medium distinct light brown (7.5YR 6/3) mottles; moderate coarse angular blocky structure; firm, nonsticky, slightly plastic; many very fine and few fine irregular pores; many medium distinct yellowish brown (10YR 5/6) soft iron accumulations; few distinct clay films on faces of peds; strongly acid; clear smooth boundary.

2Cg2—58 to 72 inches; light brownish gray (2.5Y 6/2) loam; common medium faint light yellowish brown (2.5Y 6/3) mottles; weak coarse subangular blocky structure; firm, slightly sticky, slightly plastic; common very fine and few fine irregular pores; few medium prominent yellowish brown (10YR 5/8) soft iron accumulations; strongly acid.

The thickness of the solum ranges from 30 to 60 inches. Depth to a seasonal high water table ranges from 18 to 36 inches from January to April. Reaction ranges from extremely acid to strongly acid in unlimed areas and from moderately acid to neutral in limed areas.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 or 4. It is silt loam.

The E or BE horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 or 4. It is silt loam. Iron accumulations may occur.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 to 6. It is silt loam or silty clay loam. Redoximorphic features may occur.

The Btg horizon, if it occurs, has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 1 or 2. It is commonly silt loam and less commonly silty clay loam. Iron accumulations have hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 4 to 8.

The 2BC or 2BCg horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 to 6. It is commonly fine sandy loam or sandy clay loam and less commonly loam or loamy sand.

The 2C or 2Cg horizon has hue of 10YR to 2.5Y, value of 5 or 6, and chroma of 1 to 8. It ranges from fine sandy loam to clay loam. The content of coarse fragments of subrounded mixed gravel ranges from 0 to 5 percent.

MtA—Mattapex-Butlertown silt loams, 0 to 2 percent slopes

Composition

Mattapex soil and similar soils: 45 percent
Butlertown soil and similar soils: 35 percent
Inclusions: 20 percent

Setting

Landform: Upland flats and bay terraces
Slope: 0 to 2 percent

Component Description

Mattapex

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Silty eolian deposits and/or fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Available water capacity: High

Butlertown

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Silty eolian deposits and/or fluviomarine sediments
Flooding: None
Kind of water table: Perched
Available water capacity: Moderate
Note: This soil has a fragipan at a depth of 25 to 40 inches that can perch water and restrict root growth.

A typical description of each soil is included, in alphabetical order, in this section. Additional

information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Othello and similar soils in the lower landform positions
- Nassawango soils in the slightly higher landform positions
- Soils that are somewhat poorly drained; in broad transitional areas near poorly drained soils

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MtB—Mattapex-Butlertown silt loams, 2 to 5 percent slopes

Composition

Mattapex soil and similar soils: 45 percent
Butlertown soil and similar soils: 35 percent
Inclusions: 20 percent

Setting

Landform: Upland flats, bay terraces, and side slopes
Slope: 2 to 5 percent
Note: Slopes are dominantly 2 to 3 percent.

Component Description

Mattapex

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Silty eolian deposits and/or fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Available water capacity: High

Butlertown

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Silty eolian deposits and/or fluviomarine sediments
Flooding: None
Kind of water table: Perched
Available water capacity: Moderate
Note: This soil has a fragipan at a depth of 25 to 40 inches that can perch water and restrict root growth.

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Soils that are somewhat poorly drained; in broad transitional areas near poorly drained soils
- Nassawango soils in the slightly higher landform positions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MtC—Mattapex silt loam, 5 to 10 percent slopes

Composition

Mattapex soil and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Uplands and side slopes
Slope: 5 to 10 percent
Note: Slopes are dominantly 5 to 7 percent.

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Silty eolian deposits and/or fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Available water capacity: High

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Nassawango soils in the higher landform positions or in areas nearer to streams
- Soils similar to the Mattapex soil that have slopes of less than 5 percent

• Soils that are somewhat poorly drained; in drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

M-W—Miscellaneous water

This map unit consists of small manmade areas of water that are used for industrial or sanitary purposes.

Nassawango Series

The soils of the Nassawango series are very deep and well drained. Permeability is moderately slow or moderate. These soils formed in silty eolian or alluvial sediments and the underlying alluvial sediments. They are on upland flats. Slopes range from 0 to 5 percent. Nassawango soils are fine-silty, mixed, mesic Typic Hapludults.

Nassawango soils are similar to Matapeake soils and are commonly adjacent to Mattapex and Othello soils. The Nassawango soils differ from Matapeake soils in having a seasonal high water table at a depth of 48 to 72 inches. The Nassawango soils do not have the grayish mottles that typically occur in the solum of Mattapex and Othello soils.

Typical pedon of Nassawango silt loam, 0 to 2 percent slopes; in a crop field just north of Wye Island, 1,000 feet north of Wye Narrows, 50 feet west of Wye Island Road; USGS Queenstown, Maryland topographic quadrangle; lat. 38 degrees 54 minutes 41 seconds N. and long. 76 degrees 7 minutes 58 seconds W.

Ap—0 to 10 inches; brown (10YR 5/3) silt loam; moderate medium and fine granular structure; very friable, slightly sticky, slightly plastic; many very fine and common fine roots; many very fine, common fine, and few medium irregular pores; neutral; abrupt smooth boundary.

Bt1—10 to 23 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; very friable, slightly sticky, slightly plastic; common very fine and few fine and medium roots; many very fine and few fine and medium random tubular pores; slightly acid; clear smooth boundary.

Bt2—23 to 40 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine and few fine roots; many very fine and few fine and medium random tubular pores; common distinct clay films on faces of peds and lining pores; slightly acid; clear wavy boundary.

2BC—40 to 52 inches; yellowish brown (10YR 5/6) sandy loam; few medium and coarse distinct light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; very friable, slightly sticky, slightly plastic; few very fine roots; many very fine and few fine random tubular pores; few faint clay films on faces of peds and clay bridging between sand grains; 5 percent rounded quartzite gravel; moderately acid; clear wavy boundary.

2C—52 to 66 inches; very pale brown (10YR 7/4) stratified loamy sand and sandy clay loam; massive; very friable; few very fine roots; common very fine and few fine irregular pores; few medium faint very pale brown (10YR 7/3) iron depletions; many medium distinct yellowish brown (10YR 5/6) soft iron accumulations; moderately acid; clear wavy boundary.

2Cg—66 to 72 inches; light gray (10YR 7/2) fine sand; single grain; loose; strongly acid.

The thickness of the solum ranges from 35 to 60 inches. Depth to a seasonal high water table ranges from 42 to 72 inches from January to April. Reaction ranges from extremely acid to strongly acid in unlimed areas and from moderately acid to neutral in limed areas.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 3 or 4. It is typically silt loam, but in some pedons it is loam.

The E horizon or other transitional horizon, if it occurs, has hue of 10YR, value of 5 or 6, and chroma of 3 to 6. It is silt loam.

The Bt horizon has hue of 7.5YR to 2.5Y and value and chroma of 4 to 6. It is commonly silt loam but may be silty clay loam. Mottling in this horizon in some pedons is due to reduction and oxidation for short periods of time because of water tension films on structural peds. The high water table does not occur in this horizon.

The BC horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 4 to 6. It is silt loam.

The 2BC horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 4 to 6. It is sandy loam, sandy clay loam, loam, or clay loam. The content of coarse fragments of quartzite or mixed rounded to subrounded gravel ranges from 0 to 10 percent.

The C horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 to 8. It commonly has iron depletions and accumulations. It is silt loam or silty clay loam.

The 2C horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 3 to 6. It commonly has iron depletions and accumulations below a depth of 48 inches. The horizon is commonly sandy loam, loam, or sandy clay loam, but it ranges from fine sand to clay loam and is commonly stratified. The content of coarse fragments of mixed subrounded gravel ranges from 0 to 10 percent.

The 2Cg or 3Cg horizon has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 1 or 2. It is commonly sandy loam or sandy clay loam, but it ranges from sand to clay loam and is commonly stratified. The content of coarse fragments of mixed subrounded gravel ranges from 0 to 10 percent. In some pedons this horizon occurs below a depth of 72 inches.

NsA—Nassawango silt loam, 0 to 2 percent slopes

Composition

Nassawango soil and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Upland flats and bay terraces
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Silty eolian deposits and/or fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Available water capacity: Very high
Note: Depth to the seasonal high water table ranges from 42 to 72 inches.

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see “Contents”).

Inclusions

- Butlertown soils in the slightly lower landform positions
- Mattapex and similar soils in the slightly lower landform positions
- Matapeake and similar soils in the slightly higher landform positions

Management

For general and detailed information about managing this map unit, see the section “Use and Management of the Soils.”

NsB—Nassawango silt loam, 2 to 5 percent slopes

Composition

Nassawango soil and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Upland flats, bay terraces, and side slopes
Slope: 2 to 5 percent
Note: Slopes are dominantly 2 to 3 percent.

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Silty eolian deposits and/or fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Available water capacity: Very high
Note: Depth to the seasonal high water table ranges from 42 to 72 inches.

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see “Contents”).

Inclusions

- Mattapex soils in the slightly lower landform positions
- Matapeake soils in the slightly higher landform positions

Management

For general and detailed information about managing this map unit, see the section “Use and Management of the Soils.”

Othello Series

The soils of the Othello series are very deep and poorly drained. Permeability is moderately slow in the solum and moderately rapid in the substratum. These soils formed in silty eolian or alluvial sediments

overlying stratified sandy alluvial marine sediments. They are on terraces, on upland flats, and in depressions. Slopes range from 0 to 2 percent. Othello soils are fine-silty, mixed, mesic Typic Endoaquults.

Othello soils are similar to Whitemarsh soils and commonly adjacent to Butlertown, Matapeake, Mattapex, and Nassawango soils. Butlertown soils have a fragipan and do not have a reduced matrix in the solum. Matapeake and Nassawango soils do not have redoximorphic features in the solum like Othello soils. Mattapex soils do not have a reduced matrix in the surface and subsurface horizons. Whitemarsh soils have an abrupt textural change between the ochric epipedon and the argillic horizon and a deeper solum.

Typical pedon of Othello silt loam; in a wooded area on the Queenstown golf course, approximately 1.3 miles southwest of Queenstown, approximately 1,700 feet northwest along an old lane to woods from its intersection with the entrance ramp from Route 50 to Route 301; USGS Queenstown, Maryland topographic quadrangle; lat. 38 degrees 58 minutes 43 seconds N. and long. 76 degrees 10 minutes 41 seconds W.

Oi—0 to 2 inches; undecomposed and partially decomposed leaves and twigs.

A—2 to 4 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots throughout; few very fine tubular pores; very strongly acid; clear smooth boundary.

Eg—4 to 12 inches; light brownish gray (2.5Y 6/2) silt loam; moderate medium platy structure; firm, slightly sticky, slightly plastic; few fine and medium and very few coarse roots; few very fine tubular pores; common fine distinct brownish yellow (10YR 6/6) soft iron accumulations; very strongly acid; clear smooth boundary.

Btg1—12 to 30 inches; gray (10YR 6/1) silt loam; moderate medium subangular blocky structure; firm, slightly sticky, slightly plastic; common very fine and fine, few medium, and very few coarse roots; few very fine tubular pores; common medium distinct yellowish brown (10YR 5/8) soft iron accumulations; common distinct gray (10YR 5/1) clay films on faces of peds and in pores; very strongly acid; clear wavy boundary.

Btg2—30 to 38 inches; gray (10YR 5/1) silt loam; common medium faint dark grayish brown (10YR 4/1) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; many very fine and fine and few medium roots in cracks; few fine and medium tubular pores; few patchy faint clay films on faces of peds; very strongly acid; clear smooth boundary.

2Cg1—38 to 43 inches; light brownish gray (10YR 6/2) loamy sand; massive; loose; few very fine and fine roots; few fine distinct dark yellowish brown (10YR 4/6) iron accumulations; very strongly acid; clear smooth boundary.

2Cg2—43 to 66 inches; light gray (2.5Y 7/2) sand; light olive brown and olive brown (2.5Y 5/3, 6/3) strata; massive; loose; few very fine and fine roots; very strongly acid; clear wavy boundary.

2C—66 to 72 inches; light yellowish brown (10YR 6/4) loamy sand; massive; loose; few medium distinct yellowish brown (10YR 5/8) iron accumulations; few medium distinct light brownish gray (10YR 6/2) iron depletions; strongly acid.

The thickness of the solum ranges from 24 to 50 inches. Reaction ranges from extremely acid to strongly acid in unlimed areas and to neutral in heavily limed areas.

The A horizon has hue of 10YR or 2.5Y, value of 2 to 5, and chroma of 2 or 3. It is silt loam.

The Eg, BEg, BE, or E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 to 4. Chroma of 3 or 4 occurs no deeper than 10 inches. The horizon is silt loam. Iron concentrations and depletions may occur.

The Btg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. It is silt loam or silty clay loam. Iron concentrations and depletions have hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 1 to 8.

The 2BCg horizon, if it occurs, has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is commonly sandy loam or loam and less commonly loamy sand. It commonly has iron concentrations.

The 2Cg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 0 to 2. It is loamy sand, sand, or sandy loam and may be stratified with finer textures. Sandier textures may have chroma of 3, and thin strata of high-chroma material may occur. The horizon commonly has iron accumulations.

Ot—Othello silt loam

Composition

Othello soil and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Upland flats, depressions, lowland flats, and swales
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Poorly drained
Dominant parent material: Silty eolian deposits and/or fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Available water capacity: Moderate

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Mattapex and similar soils in the slightly higher landform positions and on shoulders of slopes along drainageways
- Soils that are somewhat poorly drained; in narrow areas transitional to better drained soils
- Kentuck soils in depressions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Pineyneck Series

The soils of the Pineyneck series are very deep and moderately well drained. Permeability is moderate in the solum and moderate to rapid in the substratum. These soils formed in unconsolidated stratified alluvial and marine sediments capped with a thin veneer of loamy eolian deposits having a high content of silt. They are on level to sloping upland flats, in swales, and in small depressions. Slopes range from 0 to 10 percent. Pineyneck soils are coarse-loamy, mixed, mesic Aquic Hapludults.

Pineyneck soils are commonly adjacent to Carmichael, Downer, Greenwich, Hammonton, Ingleside, Sassafras, and Unicorn soils. Downer, Greenwich, Ingleside, Sassafras, and Unicorn soils are well drained. Carmichael soils are poorly drained. Hammonton soils do not have loam and silt loam textures in the solum.

Typical pedon of Pineyneck silt loam, 0 to 2 percent slopes; in a cultivated field on Tilghman Neck, north of Tilghman Creek, 50 feet west of Tilghman Neck Road, 1,200 feet north of the point at which the road turns north; USGS Langford Creek, Maryland topographic quadrangle; lat. 39 degrees 2 minutes 15 seconds N. and long. 76 degrees 9 minutes 59 seconds W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam; weak fine subangular blocky structure parting to weak fine granular; very friable, slightly sticky, nonplastic; many very fine and fine roots throughout; common very fine tubular pores; 1 percent subrounded gravel; neutral; clear wavy boundary.

E—9 to 14 inches; yellowish brown (10YR 5/4) silt loam; weak medium prismatic structure parting to weak medium subangular blocky; friable, brittle, slightly sticky, nonplastic; common very fine and fine roots between peds; many very fine and fine and common medium tubular pores; common fine faint yellowish brown (10YR 5/6) iron accumulations; neutral; clear wavy boundary.

Bt1—14 to 20 inches; yellowish brown (10YR 5/6) silt loam; moderate medium prismatic structure parting to weak medium subangular blocky; friable, slightly sticky, slightly plastic; common very fine and fine roots throughout; many very fine and fine and common medium tubular pores; common medium faint strong brown (7.5YR 5/6) iron accumulations; few distinct clay films on faces of peds and in pores; neutral; clear wavy boundary.

Bt2—20 to 27 inches; yellowish brown (10YR 5/6) loam; moderate medium prismatic structure parting to weak medium platy; friable, slightly sticky, slightly plastic; common very fine and fine roots throughout; common very fine and fine tubular pores; many fine and medium distinct light brownish gray (10YR 6/2) iron depletions and common medium distinct strong brown (7.5YR 5/8) iron accumulations; common distinct clay films on faces of peds and in pores; neutral; abrupt wavy boundary.

2BC—27 to 32 inches; strong brown (7.5YR 5/6) fine sandy loam; weak coarse prismatic structure parting to weak medium subangular blocky; firm, slightly brittle, slightly sticky, nonplastic; common very fine roots throughout; common very fine, fine, and medium tubular pores; common fine distinct pale brown (10YR 6/3) iron depletions; many medium faint yellowish brown (10YR 5/6) and few fine prominent red (2.5YR 4/8) iron accumulations; few fine black (10YR 2/1) slightly hard masses of iron and manganese throughout; few distinct clay films on faces of peds and in pores; slightly acid; abrupt smooth boundary.

2C1—32 to 36 inches; light yellowish brown (2.5Y 6/3) loamy fine sand; massive; friable; few very fine roots throughout; common medium tubular pores; many medium faint light yellowish brown (2.5Y

6/4) and common fine prominent strong brown (7.5YR 5/8) iron accumulations; slightly acid; abrupt wavy boundary.

2C2—36 to 47 inches; yellowish brown (10YR 5/6) loamy fine sand; weak coarse platy structure; firm, slightly brittle; common medium tubular pores; common medium distinct light gray (2.5Y 7/2) iron depletions and many medium faint strong brown (7.5YR 5/6) iron accumulations; very strongly acid; abrupt smooth boundary.

3Cg1—47 to 54 inches; gray (5Y 6/1) loam; massive; friable, slightly sticky, slightly plastic; common medium, fine, and very fine tubular pores; common medium distinct light yellowish brown (2.5Y 6/3) and common fine prominent yellowish brown (10YR 5/8) iron accumulations; very strongly acid; clear wavy boundary.

3Cg2—54 to 61 inches; light gray (5Y 7/1) silt loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; many medium, fine, and very fine tubular pores; common medium prominent yellowish brown (10YR 5/6) and common fine prominent strong brown (7.5YR 4/6) iron accumulations; few prominent clay films in root channels and pores; extremely acid; clear smooth boundary.

4Ab—61 to 68 inches; gray (N 5/0) loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; many very fine, fine, and medium tubular pores; common medium prominent light olive brown (2.5Y 5/4) iron accumulations; few prominent clay films in root channels and pores; very strongly acid; clear smooth boundary.

4C´g—68 to 72 inches; dark gray (10YR 4/1) loam; massive; friable, slightly sticky, slightly plastic; many very fine and fine and common medium tubular pores; common medium distinct light gray (10YR 7/1) iron depletions in cracks and common fine prominent yellowish brown (10YR 5/8) iron accumulations throughout; very strongly acid.

The thickness of the solum ranges from 20 to 50 inches. The content of rock fragments, dominantly quartzite and chert gravel, ranges from 0 to 10 percent throughout the profile. The silt content in the A horizon, E horizon, and upper part of the Bt horizon ranges from 35 to 60 percent. Reaction ranges from extremely acid to strongly acid in unlimed areas and from slightly acid to neutral in heavily limed areas.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 to 4. It is dominantly loam or silt loam and less commonly fine sandy loam or sandy loam.

The E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 to 6. It is loam, silt loam, or sandy loam. Iron accumulations occur in some pedons.

The BE horizon, if it occurs, has colors similar to those of the E horizon. It is commonly loam and less commonly sandy loam.

The Bt horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 5 to 7, and chroma of 1 to 8. It is typically loam or silt loam, but in the lower part of the argillic horizon texture can include sandy loam and coarse sandy loam or thin layers of sandy clay loam. Iron depletions, which occur in the lower part of the Bt horizon, have hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. Iron accumulations have hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 4 to 8. The horizon has 0 to 10 percent gravel.

The BC horizon, if it occurs, has hue of 7.5YR, 10YR, or 2.5Y, value of 5 to 7, and chroma of 1 to 8. It is commonly loamy sand, loam, or fine sandy loam and less commonly sandy loam or silt loam. It is stratified in some areas. Iron depletions have hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 1 to 3. Iron accumulations have hue of 2.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8.

The Cg or C´g horizon has hue of 10YR to 5Y, value of 3 to 8, and chroma of 0 to 2. It is loam, silt loam, or sandy loam, but it is commonly stratified and may include loamy sand, sandy loam, or clay loam.

The C horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is sand, loamy sand, loamy fine sand, or sandy loam and is commonly stratified. Some pedons include strata of sandy clay loam, loam, or silt loam. The horizon commonly has iron accumulations and depletions.

The Ab horizon has hue of 10YR to 5Y, value of 5 or 6, and chroma of 0 or 1. It is loam or silt loam.

PiA—Pineyneck silt loam, 0 to 2 percent slopes

Composition

Pineyneck soil and similar soils: 80 percent
Inclusions: 20 percent

Setting

Landform: Upland flats and shallow depressions
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Loamy eolian deposits and/or fluviomarine sediments

Flooding: None
Kind of water table: Apparent
Available water capacity: High

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

• Unicorn and similar soils in the slightly higher landform positions
• Carmichael soils in the lower landform positions
• Soils that are somewhat poorly drained; in the lower landform positions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

PiB—Pineyneck silt loam, 2 to 5 percent slopes

Composition

Pineyneck soil and similar soils: 80 percent
Inclusions: 20 percent

Setting

Landform: Upland flats and shallow depressions
Slope: 2 to 5 percent
Note: Slopes are dominantly 2 to 3 percent.

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Loamy eolian deposits and/ or fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Available water capacity: High

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

• Unicorn and similar soils in the higher landform positions
• Soils that are somewhat poorly drained; in the lower landform positions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils" (fig. 6).

PiC—Pineyneck silt loam, 5 to 10 percent slopes

Composition

Pineyneck soil and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Uplands and side slopes
Slope: 5 to 10 percent
Note: Slopes are dominantly 5 to 7 percent.

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Loamy eolian deposits and/ or fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Available water capacity: High

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

• Unicorn and similar soils on the higher parts of the slope
• Soils that are somewhat poorly drained; on the lower parts of the slope

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Puckum Series

The soils of the Puckum series are very deep and very poorly drained. Permeability is moderately rapid. These soils formed in highly decomposed organic

Figure 6.—A riparian buffer strip of grasses and trees on Pineyneck silt loam, 2 to 5 percent slopes, along Eastern Bay.

materials derived from woody plants. They are located in freshwater swamps. Slopes range from 0 to 2 percent. Mean annual temperature is 55 degrees F, and mean annual precipitation is 45 inches. Puckum soils are dysic, mesic Typic Medisaprists.

Puckum soils are similar to Bestpitch, Honga, and Longmarsh soils and are commonly adjacent to Carmichael, Hurlock, Othello, and Zekiah soils. Longmarsh soils are very poorly drained mineral soils. Bestpitch and Honga soils are organic soils that formed under the influence of brackish tidal waters. Carmichael, Hurlock, Othello, and Zekiah soils are mineral soils and are poorly drained.

Typical pedon of Puckum mucky peat; on a 0 percent slope, in a wooded area about 2¼ miles north of the town of Queen Anne, about 4,400 feet south along Tuckahoe Creek from its intersection with Crouse Mill Road, about 900 feet west of Tuckahoe Creek, about 100 feet south of a small tributary to Tuckahoe Creek; USGS Ridgely, Maryland topographic quadrangle; lat. 38 degrees 57 minutes 17 seconds N. and long. 75 degrees 56 minutes 43 seconds W.

Oe—0 to 12 inches; black (10YR 2/1) mucky peat, hemic soil material; fiber content is one-tenth of the soil volume after rubbing; many leaf and wood fragments; strongly acid; abrupt smooth boundary.

Oa1—12 to 18 inches; very dark gray (N 3/0) muck, sapric soil material; fiber content is less than one-twentieth of the soil volume after rubbing; many leaf and wood fragments; strongly acid; clear smooth boundary.
Oa2—18 to 55 inches; black (N 2/0) muck, sapric soil material; fiber content is less than one-twentieth of the soil volume after rubbing; many fine roots; strongly acid; clear smooth boundary.
Oa3—55 to 72 inches; very dark gray (10YR 3/1) muck, sapric soil material; fiber content is less than one-sixth of the soil volume after rubbing; strongly acid.

The thickness of the organic deposits ranges from 52 to more than 72 inches. Wood fragments occur in some part of the profile in most pedons. The content of wood fragments ranges from 0 to 25 percent, by volume. The fragments consist of twigs, branches, logs, or stumps and are 1/2 inch to 12 inches in diameter. The wood fragments are firm but break under pressure. Conductivity of the saturation extract is less than 4 millimhos per centimeter throughout the profile. Reaction ranges from extremely acid to strongly acid.

The surface tier has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. It is hemic or sapric soil material or mucky silt loam stratified with silty clay loam. The fiber content after rubbing is less than one-half of the soil volume. The content of mineral material ranges from 10 to 55 percent, by weight.

The subsurface and bottom tiers have hue of 10YR, value of 2 or 3, and chroma of 0 or 1. They are sapric soil material. The fiber content after rubbing is between one-sixth and one-twentieth of the soil volume. The content of mineral material ranges from 25 to 70 percent, by weight.

Some pedons contain thin strata of loamy, silty, or sandy mineral material within the control section.

The Cg horizon, if it occurs, is below a depth of 51 inches and has hue of 5Y, value of 4, and chroma of 1. It is silt loam or silty clay loam. It has an *n* value greater than 1.0.

Pk—Puckum mucky peat

Composition

Puckum soil and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Swamps, flood plains, and depressions
Slope: 0 to 2 percent
Note: Most areas of this map unit are used as habitat for wetland wildlife. The natural vegetation and soil provide suitable habitat for the feeding and nesting of small mammals, amphibians, reptiles, and waterfowl. The soil is a valuable storage medium for the retention of nutrients (nitrogen and phosphorus), floodwaters, sediment, and potential pollutants.

Component Description

Surface layer texture: Mucky peat
Depth class: Very deep (more than 60 inches)
Drainage class: Very poorly drained
Dominant parent material: Organic woody deposits
Flooding: Frequent
Kind of water table: Apparent
Ponding: Very long
Available water capacity: Very high

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Fallsington and similar soils on adjacent low-lying uplands
- Mineral soils that have organic surface layers
- Zekiah and Longmarsh soils on the narrower flood plains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Sassafras Series

The soils of the Sassafras series are very deep and well drained. Permeability is moderate in the subsoil and moderate to rapid in the substratum. These soils formed in stratified alluvial coastal plain sediments. They are on uplands and side slopes. Slopes range from 0 to 10 percent. Sassafras soils are fine-loamy, siliceous, mesic Typic Hapludults.

Sassafras soils are similar to Downer soils and are commonly adjacent to Fort Mott, Galestown, Hammonton, Ingleside, Pineyneck, and Unicorn soils. The Sassafras soils have more clay in the B horizon than Downer and Galestown soils and more clay in the A and E horizons than what is typical for Fort Mott soils. They do not have the grayish mottles that typically occur in the B horizon of Hammonton and

Pineyneck soils. The Sassafras soils do not have the grayish mottles in the substratum that typically occur in Ingleside and Unicorn soils.

Typical pedon of Sassafras loam in an area of Unicorn-Sassafras loams, 0 to 2 percent slopes; from the intersection of Route 304 and Bridgetown Road, 1.4 miles north along Bridgetown Road, approximately 2,000 feet east of Bridgetown Road (approximately 1.5 miles north-northeast of Bridgetown Church), in a crop field; USGS Price, Maryland topographic quadrangle; lat. 39 degrees 3 minutes 9 seconds N. and long. 75 degrees 52 minutes 44 seconds W.

Ap—0 to 10 inches; brown (10YR 4/3) loam; weak fine granular structure; very friable, slightly sticky, slightly plastic; common very fine and fine roots; common fine and very fine interstitial and few medium tubular pores; neutral; abrupt smooth boundary.

BE—10 to 13 inches; dark yellowish brown (10YR 4/6) loam; weak fine subangular blocky structure; very friable, slightly sticky, slightly plastic; common very fine and fine roots; common fine and very fine interstitial and few medium tubular pores; neutral; clear smooth boundary.

Bt1—13 to 23 inches; strong brown (7.5YR 4/6) loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable, slightly sticky, slightly plastic; common fine and very fine and few medium roots; common fine and very fine interstitial and few medium tubular pores; few faint clay films lining pores; slightly acid; clear smooth boundary.

Bt2—23 to 33 inches; dark yellowish brown (10YR 4/6) loam; moderate medium subangular blocky structure; friable, slightly sticky, plastic; common fine and few very fine roots; common fine and few very fine tubular pores; common distinct clay films on faces of peds and in pores; slightly acid; clear smooth boundary.

BC—33 to 50 inches; yellowish brown (10YR 5/6) sandy loam; few medium distinct pale yellow (2.5Y 7/4) mottles; weak coarse subangular blocky structure; friable, slightly sticky, slightly plastic; few fine and medium roots; common fine interstitial and few medium tubular pores; slightly acid; clear smooth boundary.

C1—50 to 56 inches; yellowish brown (10YR 5/6) loamy sand; massive; loose; common fine interstitial and few medium tubular pores; slightly acid; clear wavy boundary.

C2—56 to 72 inches; brownish yellow (10YR 6/6) loamy sand; massive; loose; few fine interstitial and tubular pores; slightly acid.

The thickness of the solum typically ranges from 30 to 60 inches. Reaction ranges from extremely acid to strongly acid in unlimed areas and from moderately acid to neutral in limed areas. The content of gravel ranges from 0 to 5 percent, by volume, in the solum and from 0 to 20 percent in the C horizon.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is sandy loam or loam.

The E horizon, if it occurs, has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. It is loam or sandy loam. In some pedons the E horizon has been mixed with the Ap horizon by plowing.

The BE horizon, if it occurs, has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. It is loam or sandy loam.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is sandy loam, sandy clay loam, or loam.

The BC horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. It is loamy sand or sandy loam.

The C horizon has hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 3 to 8. It is sand, loamy sand, sandy loam, or the gravelly analogues of these textures.

UbB—Udorthents, borrow area, 0 to 5 percent slopes

Composition

Udorthents: 85 percent
Inclusions: 15 percent

Setting

Slope: 0 to 5 percent
Note: Most of this map unit consists of borrow areas that have been mined for sand and gravel and areas that have been cut and filled.

Component Description

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Flooding: None
Kind of water table: Apparent
Available water capacity: Moderate

Inclusions

- Downer and similar soils in undisturbed areas
- Ingleside soils in undisturbed areas
- Areas of escarpments and short, steep slopes

UdB—Udorthents and Sulfaquents, dredge spoil, 0 to 5 percent slopes

Composition

Udorthents and similar soils: 45 percent
Sulfaquents and similar soils: 45 percent
Inclusions: 10 percent

Setting

Slope: 0 to 5 percent
Note: Areas of this map unit are used for disposal of sediments dredged for boat traffic and are in various stages of reclamation.

Component Description

Udorthents

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Flooding: None
Kind of water table: Apparent
Available water capacity: Moderate

Sulfaquents

Surface layer texture: Variable
Note: Reaction becomes extremely acid to strongly acid upon drying the soil material. There are high levels of reduced sulfur compounds.

Inclusions

- Whitemarsh and similar soils in small undisturbed areas
- Mattapex soils in small undisturbed areas
- Butlertown soils in small undisturbed areas
- Small areas that have slopes of more than 5 percent

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

UlB—Udorthents, landfill, 0 to 5 percent slopes

Composition

Udorthents: 80 percent
Inclusions: 20 percent

Setting

Slope: 0 to 5 percent
Note: Most of this map unit consists of disturbed areas that are used for the disposal of municipal refuse or rubble.

Component Description

Surface layer texture: Variable

Inclusions

- Downer and similar soils in undisturbed areas
- Unicorn soils in undisturbed areas
- Small areas that have slopes of more than 5 percent

Unicorn Series

The soils of the Unicorn series are very deep and well drained but have a seasonal high water table at a depth of 42 to 72 inches from January to May. Permeability is moderate or moderately rapid in the solum and ranges to rapid in the substratum. These soils formed in unconsolidated stratified alluvial and marine sediments capped with a thin veneer of loamy eolian deposits having a high content of silt. They are on level to strongly sloping uplands. Slopes range from 0 to 15 percent. Unicorn soils are coarse-loamy, mixed, mesic Typic Hapludults.

Unicorn soils are commonly adjacent to Carmichael, Downer, Hammonton, Hurlock, Ingleside, Pineyneck, and Sassafras soils. Ingleside soils do not have loam and silt loam textures in the solum. Sassafras and Downer soils do not have a fluctuating seasonal high water table above a depth of 72 inches. Pineyneck and Hammonton soils are moderately well drained. Carmichael and Hurlock soils are poorly drained.

Typical pedon of Unicorn loam in an area of Unicorn-Sassafras loams, 0 to 2 percent slopes; in a cultivated field east of Sudlersville, 3,200 feet southwest of the intersection of Felton School Road and Andover Branch, 4,090 feet east-northeast of the intersection of Route 300 and Peter's Corner Road, approximately 30 feet east of the woods and 410 feet from the southwest corner of the field; USGS Sudlersville, Maryland-Delaware topographic quadrangle; lat. 39 degrees 12 minutes 1 second N. and long. 75 degrees 46 minutes 35 seconds W.

Ap—0 to 11 inches; brown (10YR 4/3) loam; weak coarse granular structure; very friable, slightly sticky, slightly plastic; common very fine and fine roots throughout; few very fine and fine tubular pores; 2 percent subrounded gravel; neutral; abrupt irregular boundary.

Bt/E—11 to 18 inches; dark yellowish brown (10YR 4/6) loam (Bt part); yellowish brown (10YR 5/4) loam (E part); moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine and fine roots throughout; few very fine and fine and few medium

tubular pores; common faint patchy yellowish brown (10YR 5/4) clay films on faces of peds; 3 percent subrounded mixed gravel; neutral; clear smooth boundary.

Bt1—18 to 24 inches; dark yellowish brown (10YR 4/6) loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine and fine roots throughout; common very fine and fine and few medium tubular pores; common faint dark yellowish brown (10YR 4/6) clay films on faces of peds and in pores; 4 percent subrounded mixed gravel; neutral; abrupt wavy boundary.

2Bt2—24 to 35 inches; strong brown (7.5YR 4/6) sandy loam; weak coarse subangular blocky structure; friable, slightly sticky, nonplastic; few fine and medium roots between peds; few very fine and fine tubular pores; common faint brown (7.5YR 4/4) clay films on faces of peds; 6 percent subangular mixed gravel; slightly acid; clear wavy boundary.

2C1—35 to 51 inches; 70 percent strong brown (7.5YR 5/8) and 30 percent brown (7.5YR 4/4) loamy sand; common yellowish brown (10YR 5/6 and 5/4) and black (10YR 2/1) lamina; single grain; very friable; strongly acid; abrupt broken boundary.

3C2—51 to 58 inches; light yellowish brown (2.5Y 6/3) silt loam; massive; firm, slightly sticky, slightly plastic; common coarse roots throughout and common fine roots in cracks; common very fine and fine tubular pores; common medium faint light brownish gray (2.5Y 6/2) iron depletions; common medium prominent strong brown (7.5YR 4/6) and many coarse distinct brownish yellow (10YR 6/6) iron accumulations; 5 percent subrounded mixed gravel; very strongly acid; clear wavy boundary.

3C3—58 to 71 inches; stratified light yellowish brown (2.5Y 6/3) silt loam and brownish yellow (10YR 6/6) loamy sand; massive; very friable, slightly sticky, nonplastic; common very fine and fine and few coarse roots throughout; common very fine and fine tubular pores; common medium faint light brownish gray (2.5Y 6/2) iron depletions and common medium and coarse distinct olive yellow (2.5Y 6/6) iron accumulations; extremely acid; abrupt wavy boundary.

4C4—71 to 79 inches; 75 percent olive yellow (2.5Y 6/6) and 25 percent brownish yellow (10YR 6/8) loamy sand; single grain; loose; 5 percent subrounded gravel; extremely acid.

The thickness of the solum ranges from 22 to 55 inches. The content of rock fragments, dominantly quartzite and chert gravel, ranges from 0 to 5 percent in the surface layer and the upper part of the B horizon and from 0 to 25 percent in the lower part of the B horizon and in the C horizon. The silt content in the A horizon, E horizon, and upper part of the Bt horizon ranges from 35 to 60 percent. Reaction ranges from extremely acid to strongly acid in unlimed areas and to neutral in heavily limed areas.

The Ap or A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 6. It is dominantly loam or silt loam and less commonly fine sandy loam or sandy loam. It has 0 to 5 percent gravel.

The E horizon typically occurs only in pedons that have not been disturbed. It has colors similar to those of the BE horizon. It is commonly loam and less commonly fine sandy loam.

The BE horizon, if it occurs, has hue of 10YR, value of 4 to 6, and chroma of 3 to 8. It is commonly loam or silt loam and less commonly sandy loam. It has 0 to 5 percent gravel.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is loam or silt loam. Iron accumulations have hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Iron depletions, if they occur, are below a depth of 40 inches and have hue of 10YR, value of 6, and chroma of 2.

The 2Bt horizon, if it occurs, has the same colors as those of the Bt horizon. It is sandy loam or loam, has a lower silt content than the overlying horizons, and may include thin layers of clay loam, sandy clay loam, or loamy sand. It has 0 to 10 percent gravel.

The BC horizon, if it occurs, has hue of 10YR or 7.5YR, value of 4 to 7, and chroma of 3 to 8. It is commonly sandy loam or loamy sand or the gravelly analogues of these textures. It is less commonly loam to fine sandy loam. Iron accumulations have hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Iron depletions, if they occur, have hue of 10YR, value of 6 or 7, and chroma of 2. The horizon has 0 to 25 percent gravel.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 8, and chroma of 1 to 8. It is commonly stratified and loamy sand, sandy loam, silt loam, or loam. It is less commonly sandy clay loam or clay loam or the gravelly analogues of these textures. Iron accumulations and depletions have hue of 7.5YR to 5Y, value of 4 to 7, and chroma of 1 to 8. The horizon has 0 to 25 percent gravel.

UoA—Unicorn silt loam, 0 to 2 percent slopes

Composition

Unicorn soil and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Upland flats and knolls
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loamy eolian deposits and/or fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Available water capacity: High
Note: Depth to the seasonal high water table ranges from 42 to 72 inches.

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Greenwich and similar soils in the slightly higher landform positions or adjacent to slopes
- Pineyneck and similar soils in depressions or swales

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

UoB—Unicorn silt loam, 2 to 5 percent slopes

Composition

Unicorn soil and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Upland flats, knolls, and side slopes
Slope: 2 to 5 percent
Note: Slopes are dominantly 2 to 3 percent.

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loamy eolian deposits and/or fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Available water capacity: High
Note: Depth to the seasonal high water table ranges from 42 to 72 inches.

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Greenwich and similar soils in the slightly higher landform positions or on shoulder slopes along drainageways
- Pineyneck soils in depressions or swales
- Hammonton soils on side slopes and footslopes near drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Ur—Urban land

Composition

Urban land: 80 percent
Inclusions: 20 percent

Setting

Slope: 0 to 2 percent
Note: This map unit consists of impervious materials that support little or no vegetation. It is covered by parking lots, buildings, and adjoining highways.

Inclusions

- Small areas that are used for sediment and erosion-control ponds
- Riprap drainageways
- Mattapex soils in adjacent undisturbed areas
- Othello soils in adjacent undisturbed areas
- Nassawango soils in adjacent undisturbed areas

UsA—Unicorn-Sassafras loams, 0 to 2 percent slopes

Composition

Unicorn soil and similar soils: 55 percent
Sassafras soil and similar soils: 30 percent
Inclusions: 15 percent

Setting

Landform: Upland flats and knolls
Slope: 0 to 2 percent

Component Description

Unicorn

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loamy eolian deposits and/or fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Available water capacity: High
Note: Depth to the seasonal high water table ranges from 42 to 72 inches.

Sassafras

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loamy fluviomarine sediments
Flooding: None
Available water capacity: High

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Carmichael and similar soils in the lower landform positions
- Pineyneck and similar soils in the lower landform positions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

UsB—Unicorn-Sassafras loams, 2 to 5 percent slopes

Composition

Unicorn soil and similar soils: 45 percent
Sassafras soil and similar soils: 40 percent
Inclusions: 15 percent

Setting

Landform: Upland flats, knolls, and side slopes
Slope: 2 to 5 percent
Note: Slopes are dominantly 2 to 3 percent.

Component Description

Unicorn

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loamy eolian deposits and/or fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Available water capacity: High
Note: Depth to the seasonal high water table ranges from 42 to 72 inches.

Sassafras

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loamy fluviomarine sediments
Flooding: None
Available water capacity: High

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Pineyneck and similar soils in the lower landform positions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

UsC—Unicorn-Sassafras loams, 5 to 10 percent slopes

Composition

Unicorn soil and similar soils: 50 percent
Sassafras soil and similar soils: 35 percent
Inclusions: 15 percent

Setting

Landform: Uplands and side slopes

Slope: 5 to 10 percent
Note: Slopes are dominantly 5 to 7 percent.

Component Description

Unicorn

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loamy eolian deposits and/ or fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Available water capacity: Moderate
Note: Depth to the seasonal high water table ranges from 42 to 72 inches.

Sassafras

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loamy fluviomarine sediments
Flooding: None
Available water capacity: Moderate

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Pineyneck and similar soils in the slightly lower landform positions
- Fallsington and similar soils in small swales and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

W—Water

This map unit includes streams, lakes, ponds, and estuaries that in most years are covered with water at least during the period warm enough for plants to grow; many areas are covered throughout the year.

Whitemarsh Series

The soils of the Whitemarsh series are very deep and poorly drained. Permeability is very slow or slow in the solum and moderately slow to rapid in the substratum. These soils formed in silty eolian or alluvial sediments overlying stratified marine fluvial sediments. They are on terraces, on upland flats, and in small depressions. Slopes range from 0 to 2 percent. Whitemarsh soils are fine-silty, mixed, mesic Typic Albaquults.

Whitemarsh soils are commonly adjacent to Butlertown, Matapeake, Mattapex, Othello, and Nassawango soils. Butlertown soils are moderately well drained or well drained and have a fragipan. Matapeake and Nassawango soils are well drained. Mattapex soils are moderately well drained. Othello soils do not have an abrupt textural change between the ochric epipedon and the argillic horizon and have less clay in the subsoil than the Whitemarsh soils.

Typical pedon of Whitemarsh silt loam; in a wooded area, about 1.5 miles northeast of Centreville, approximately 1 mile north along Brick Schoolhouse Road from its intersection with Whitemarsh Road, 250 feet west of Brick Schoolhouse Road; USGS Centreville, Maryland topographic quadrangle; lat. 39 degrees 4 minutes 47 seconds N. and long. 76 degrees 1 minute 3 seconds W.

Oi—0 to 1 inch; slightly decomposed leaves and twigs from loblolly pine, sweetgum, and oak.

Oe—1 to 2 inches; moderately decomposed organic material.

A—2 to 4 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; very friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots throughout; few very fine and fine tubular pores; extremely acid; clear smooth boundary.

Eg1—4 to 8 inches; light brownish gray (10YR 6/2) silt loam; weak fine subangular blocky structure; very friable, slightly sticky, slightly plastic; few fine and medium and very few coarse roots; few very fine and fine tubular pores; few medium distinct yellowish brown (10YR 5/6) iron accumulations; very strongly acid; clear smooth boundary.

Eg2—8 to 12 inches; light gray (10YR 7/1) silt loam; weak medium subangular blocky structure; firm, slightly sticky, slightly plastic; few medium and very few coarse roots; few very fine and fine tubular pores; few medium distinct yellowish brown (10YR 5/6) iron accumulations; very strongly acid; clear wavy boundary.

Btg1—12 to 24 inches; gray (10YR 6/1) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; very firm, slightly sticky, plastic; common fine and very fine roots in cracks; few fine and medium tubular pores; common fine and medium distinct yellowish

brown (10YR 5/6) iron accumulations; few fine and medium faint light gray (10YR 7/1) iron depletions; common prominent grayish brown (10YR 5/2) clay films on faces of peds; very strongly acid; clear smooth boundary.

Btg2—24 to 37 inches; light brownish gray (2.5Y 6/2) silt loam; weak coarse prismatic structure parting to moderate fine platy; very firm, sticky, plastic; few fine and medium roots in vertical cracks; few fine tubular pores; common fine and medium prominent strong brown (7.5YR 4/6, 5/8) iron accumulations; common distinct clay films on faces of peds and in pores; very strongly acid; clear smooth boundary.

Btg3—37 to 55 inches; gray (10YR 6/1) silt loam; weak coarse prismatic structure parting to weak medium platy; firm, sticky, plastic; few fine and very fine roots between peds; common very fine and fine tubular pores; common medium distinct yellowish brown (10YR 5/4) and few medium prominent strong brown (7.5YR 5/8) iron accumulations; few faint clay films on faces of peds; very strongly acid; clear wavy boundary.

BCg—55 to 62 inches; light brownish gray (10YR 6/2) silt loam; weak coarse subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots in cracks; common very fine and fine and few medium tubular pores; few medium distinct yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 5/8) iron accumulations; few prominent clay films in pores; strongly acid; clear wavy boundary.

2Cg—62 to 72 inches; light brownish gray (2.5Y 6/2) loam; massive; firm, sticky, plastic; few fine and very fine tubular pores; few medium prominent strong brown (7.5YR 4/6) and yellowish brown (10YR 5/6) iron accumulations; 3 percent subrounded mixed gravel; strongly acid.

The thickness of the solum ranges from 40 to 66 inches. Reaction ranges from extremely acid to strongly acid in unlimed areas and from slightly acid to neutral in heavily limed areas.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 1 to 3. Value of 3 only occurs in thin upper A horizons. The horizon is silt loam. It has iron accumulations.

The E or Eg horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 to 4. Chroma of 3 or 4 occurs no deeper than 10 inches from the surface. The horizon is silt loam. It may have iron accumulations.

The BEg horizon, if it occurs, hue of 10YR to 5Y, value of 6 or 7, and chroma of 1 or 2. It is silt loam. Iron accumulations have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 6 or 8.

The Btg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. It is silty clay loam, silt loam, or silty clay. Iron accumulations have hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. Iron depletions, if they occur, have hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2.

The BCg horizon, if it occurs, has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2. It is commonly silt loam or clay loam and less commonly loam or sandy clay loam. It has iron accumulations.

The Cg or C horizon has hue of 7.5YR to 5Y, value of 3 to 8, and chroma of 1 to 8. It is commonly stratified and ranges from sand to silty clay loam. The content of mixed gravel ranges from 0 to 5 percent. It commonly has iron accumulations or iron depletions, or both.

An Ab horizon occurs in some pedons at a depth of 42 to 60 inches.

Wh—Whitemarsh silt loam

Composition

Whitemarsh soil and similar soils: 80 percent
Inclusions: 20 percent

Setting

Landform: Upland flats, depressions, lowland flats, and swales
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Poorly drained
Dominant parent material: Silty eolian deposits and/or fluviomarine sediments
Flooding: None
Kind of water table: Apparent
Available water capacity: High

A typical soil description is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Inclusions

- Mattapex and similar soils in the higher landform positions
- Soils that are somewhat poorly drained; in narrow areas transitional to better drained soils

• Kentuck soils in depressions and narrow drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Zekiah Series

The soils of the Zekiah series are very deep and poorly drained. Permeability is moderate or moderately rapid. These soils formed in loamy alluvium over sandy and gravelly sediments. They are on narrow flood plains. Slopes range from 0 to 2 percent. Zekiah soils are coarse-loamy, siliceous, acid, mesic Typic Fluvaquents.

Zekiah soils are commonly adjacent to Corsica, Hurlock, Longmarsh, Othello, and Whitemarsh soils. Hurlock, Othello, and Whitemarsh soils are poorly drained. Longmarsh and Corsica soils have an umbric epipedon.

Typical pedon of Zekiah silt loam in an area of Longmarsh and Zekiah soils, 0 to 2 percent slopes; in a wooded area, east of Church Hill, south of Southeast Creek, about 4,400 feet east of the intersection of Southeast Creek and Route 19; USGS Church Hill, Maryland topographic quadrangle; lat. 39 degrees 8 minutes 7 seconds N. and long. 75 degrees 57 minutes 41 seconds W.

Oa—0 to 1 inch; mostly decomposed organic materials.

A1—1 to 4 inches; dark grayish brown (2.5Y 4/2) silt loam; weak medium granular structure; very friable, slightly plastic; many very fine to coarse roots throughout; few fine discontinuous tubular pores; strongly acid; gradual smooth boundary.

A2—4 to 9 inches; dark gray (10YR 4/1) silt loam; weak medium subangular blocky structure; very friable, slightly plastic; many very fine to coarse roots throughout; few fine discontinuous tubular pores; strongly acid; clear smooth boundary.

Cg1—9 to 17 inches; very dark gray (10YR 3/1) loam; few medium faint dark grayish brown (10YR 4/2) mottles; massive; firm, slightly plastic; common very fine and fine roots throughout; few fine distinct dark yellowish brown (10YR 4/6) iron accumulations; very strongly acid; gradual smooth boundary.

2Cg2—17 to 29 inches; light brownish gray (10YR 6/2) loamy sand with thin strata of sandy loam; massive; very friable; many medium and coarse distinct very dark grayish brown (10YR 3/2) and common medium distinct dark yellowish brown (10YR 4/6) iron accumulations; very strongly acid; gradual smooth boundary.

2Cg3—29 to 40 inches; dark gray (10YR 4/1) stratified loamy sand and sandy loam; massive; very friable; few medium distinct yellowish brown (10YR 5/6) iron accumulations; very strongly acid; clear wavy boundary.

3Ab—40 to 56 inches; very dark gray (10YR 3/1) mucky sandy loam; massive; friable, slightly sticky; few fine roots; many decayed wood fragments; very strongly acid; clear wavy boundary.

4C′g—56 to 72 inches; dark greenish gray (5GY 4/1) silt loam; massive; friable, slightly sticky; common fine mica flakes; strongly acid.

The content of organic matter ranges from 5 to 18 percent in the A horizon. In the substratum it is variable and ranges from 1 to 10 percent. The content of coarse fragments of mixed rounded gravel ranges from 0 to 5 percent in the A horizon, from 0 to 35 percent in the substratum, and to 50 percent in some layers below a depth of 30 inches. Shell fragments occur in the substratum in some pedons. Reaction ranges from extremely acid to strongly acid throughout the profile.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 to 3. It is loam, silt loam, or mucky silt loam. It commonly has iron accumulations.

The Cg horizon has hue of 10YR, value of 3 to 6, and chroma of 1 or 2. It is loam or silt loam. It commonly has iron accumulations and depletions.

The 2Cg horizon has hue of 10YR to 5GY, value of 3 to 8, and chroma of 1 or 2. It is commonly stratified and coarse sand to sandy loam or the gravelly or very gravelly analogues of these textures. It commonly has iron accumulations and depletions.

The Ab horizon, if it occurs, has hue of 10YR, value of 2 or 3, and chroma of 0 to 2. It is mucky loam, mucky sandy loam, mucky silt loam, or sandy loam.

Some pedons have a 2C horizon below a depth of 40 inches. This horizon has hue of 2.5Y to 7.5YR, value of 4 to 7, and chroma of 3 to 6. It is sandy loam, loamy sand, fine sandy loam, or the gravelly or very gravelly analogues of these textures.

Some pedons may have 3Cg, 4Cg, or 5Cg horizons, generally at depths of more than 40 inches. These horizons have colors similar to those of the 2Cg horizon but have textures of loam or silt loam.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Generally, the soils in Queen Anne's County that are well suited to crops are also well suited to urban uses. The data concerning specific soils in the county can be used in planning future land use patterns. The potential for farming should be considered relative to any soil limitations and the potential for nonfarm development.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils are identified, the system of land capability classification used by the Natural Resources Conservation Service is explained, the estimated yields of the main crops and hay and pasture plants are listed for each soil, and prime farmland is described.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Soil Series and Detailed Soil Map Units" and in the tables. Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Federal and State regulations require that any area designated as wetlands cannot be altered without prior approval. Contact the local office of the Natural Resources Conservation Service for identification of hydric soils and potential wetlands.

In 1992, approximately 165,000 acres in Queen Anne's County were used for crops and less than 500 acres were used as permanent pasture *(16)*. The field crops suited to the soils and climate of Queen Anne's County include grain corn, soybeans, wheat, sweet corn, and barley. Soybeans are the most common crop. Specialty crops produced in the survey area include asparagus, blueberries, cucumbers, green beans, peas, spinach, tomatoes, cantaloupes, strawberries, and watermelons.

The latest information about producing row crops or specialty crops can be obtained from the local office of the Maryland Cooperative Extension Service or the Natural Resources Conservation Service.

Soil amendments.—Most of the soils in Queen Anne's County are low in natural plant nutrients, and some are very low. Almost all of the cultivated soils are acid, and some are extremely acid. Because of these conditions, additions of lime and fertilizer are needed for crop production.

Lime should be applied if soil tests indicate that the level of lime in the soil is below the optimum level for

the kinds of crops to be grown. Generally, applications are needed every 2 to 3 years. Very sandy soils, such as Galestown and Fort Mott soils, need smaller, more frequent applications. Wet, finer textured soils, such as Whitemarsh and Othello soils, require larger quantities.

Soils that are regularly cultivated become deficient in nitrogen, phosphorus, and potassium unless these elements are regularly applied. Some soils need additions of minor elements, such as sulfur, boron, manganese, and zinc. Unlike phosphorus and potassium, nitrogen does not come from the mineral part of the soil. Although nitrogen compounds are produced by some plants, especially soybeans and other legumes, nitrogen is commonly supplied through fertilization.

Applications of manure furnish large amounts of nitrogen, phosphorous, and organic matter and small amounts of other plant nutrients. Determining the amount of manure and the kinds and amounts of commercial fertilizer to be applied depends on the kind of crop to be grown.

Measures that are effective in maintaining soil fertility include applications of fertilizer, both organic and inorganic, and proper crop rotations. Controlling erosion helps to prevent the loss of organic matter and plant nutrients and thus helps to maintain productivity.

The use of fertilizers and manure based on a nutrient management program that includes soil and manure testing, equipment calibration, and timely application helps to prevent ground-water contamination and minimizes economic losses. The Cooperative Extension Service can help to determine the kind and amount of fertilizer and lime needed and the proper method of application.

Erosion control.—Approximately 40 percent of the soils in Queen Anne's County have a hazard of water erosion if they are cultivated (fig. 7). Loss of the surface layer through erosion is damaging. Plant nutrients and organic matter are lost and water infiltration and soil fertility are reduced as the surface layer is lost. Erosion on farmland results in the sedimentation of streams and a lower quality of water available for municipal use, for recreation, and for fish and wildlife.

Generally, a combination of several practices is needed to control erosion. Planting cover crops, including grasses or legumes, or both, in the cropping system, and using conservation tillage systems that include no-till farming and stubble mulching help to protect the soil from water erosion and soil blowing. These practices also help to improve the moisture-holding capacity, reduce runoff, increase infiltration, and improve the content of organic matter.

On soils susceptible to soil blowing, such as Fort Mott and Galestown soils, stripcropping, establishing barriers of tall grass, and planting field windbreaks help to conserve moisture and protect the plants from damage caused by blowing soil. Keeping the soil rough and cloddy where it is not protected by vegetation can also prevent the damage caused by soil blowing.

Practicing contour tillage and installing grassed waterways in areas of concentrated runoff help to prevent the formation of gullies on the more steeply sloping soils.

Irrigation.—Rainfall in Queen Anne's County is generally adequate for agriculture but is not always well distributed during the growing season. Frequently, there are extended dry periods between June and September. As a result, many crops are damaged. An adequate irrigation system and a good supply of water that are readily available during these dry periods can help to prevent the drastic reduction in yields.

On irrigated soils the main management concerns are efficient water use, nutrient management, erosion control, control of pests and weeds, and timely planting and harvesting. The nature of a soil determines how much water can be applied to it efficiently and the rate at which the water should be applied.

Generally, soils that have a low available water capacity or a sandy surface layer require irrigation. Conserving moisture consists primarily of reducing the evaporation and runoff rates and increasing the rate of water intake. Many conservation practices, such as conservation tillage, establishing field windbreaks, and leaving crop residue on the soil surface, help to conserve moisture (fig. 8).

Fort Mott and Galestown soils warm up early in spring and are especially suited to crops of early season vegetables in irrigated fields. In summer, irrigation is required on these soils for the optimum production of most crops.

Irrigation on Downer, Hammonton, and Ingleside soils can greatly increase crop production. On these soils late-maturing crops are sometimes damaged by drought, especially in years when rainfall is unevenly distributed. Irrigation systems can also be used to protect these soils from soil blowing.

An irrigation system that provides optimum control and distribution of water at minimum cost is needed. Properly adjusting the application rate of irrigation water according to the available water capacity, the rate of water intake, and the needs of the crop helps to prevent overirrigating and the leaching of plant nutrients. Overirrigation wastes water, can cause

Figure 7.—Fragile silt loam surface layers in an area of Mattapex-Butlertown silt loams, 2 to 5 percent slopes, erode easily if not protected with vegetation or mulch.

erosion, can create drainage problems, and can raise the water table.

Tillage.—Excessive tillage breaks down soil structure, decreases the content of organic matter, and increases the hazard of erosion. Over a period of time, the heavy equipment used in cultivating and harvesting certain crops compacts the soil and makes it difficult to work. This damage is most severe if the soil is too wet when the machinery is used. Butlertown, Carmichael, Mattapex, and Whitemarsh soils are susceptible to compaction because they have a firm subsoil and a seasonal high water table. Chisel plowing to a depth of 10 to 15 inches every 3 to 5 years can improve aeration and root development in these soils. Chisel plowing deeper than 15 inches, however, mixes the clayey subsoil with the surface layer and destroys soil tilth.

Drainage.—Improving drainage is an important management concern on more than 50,000 acres in Queen Anne's County. Drainage has already been improved in many areas. The degree of limitation and the need for drainage vary throughout the county.

Well drained soils, such as Downer, Fort Mott, Galestown, Ingleside, Matapeake, Nassawango,

Figure 8.—Small grain stubble from no-tilled corn on Downer sandy loam, 2 to 5 percent slopes, and Ingleside sandy loam, 5 to 10 percent slopes.

Unicorn, and Sassafras soils, are not limited by drainage problems. Moderately well drained soils, such as Butlertown, Hammonton, Mattapex, and Pineyneck soils, may be limited by a seasonal high water table that affects early planting and late harvesting in some years. Poorly drained soils, such as Carmichael, Hurlock, Othello, and Whitemarsh soils, have severe limitations (fig. 9). The main management concern on these soils is providing surface and subsurface drainage systems where possible. Most cultivated areas of these soils have a drainage system consisting of open main and lateral outlet ditches, shallow field ditches, and surface water leads. Areas of Carmichael, Fallsington, and Hurlock soils may also have a subsurface tile drainage system. On finer textured soils, such as Othello and Whitemarsh soils, excess surface water can be removed by properly orientating rows and smoothing and crowning fields. On all of these soils, outlet and field ditches, water leads, and subsurface tile, where present, must be maintained to produce optimum crop yields.

Managing drainage in conformance with regulations concerning wetlands may require special permits and extra planning. The local office of the Natural Resources Conservation Service should be contacted for identification of hydric soils and potential wetlands.

Cropland Limitations and Hazards

The management concerns affecting the use of the detailed soil map units in the survey area for crops are shown in table 6. The main concerns in managing nonirrigated cropland are conserving moisture,

controlling soil blowing and water erosion, and maintaining soil fertility. The limitations and hazards listed in this table apply only to the crops shown in table 7.

Conserving moisture consists primarily of reducing the evaporation and runoff rates and increasing the water intake rate. Applying conservation tillage and conservation cropping systems, farming on the contour, stripcropping, establishing field windbreaks, and leaving crop residue on the surface conserve moisture.

Generally, a combination of several practices is needed to control *soil blowing* and *water erosion.* Conservation tillage, stripcropping, field windbreaks, tall grass barriers, contour farming, conservation cropping systems, crop residue management, diversions, and grassed waterways help to prevent excessive soil loss.

Measures that are effective in maintaining *soil fertility* include applying both organic and inorganic fertilizer, including manure; incorporating crop residue or green manure crops into the soil; and using proper crop rotations. Controlling erosion helps to prevent the loss of organic matter and plant nutrients and thus helps to maintain productivity, although the level of fertility can be reduced even in areas where erosion is

Figure 9.—Water collects after a rainstorm in small areas of Carmichael loam in depressions. The majority of the field is Unicorn-Sassafras loams, 2 to 5 percent slopes.

controlled. All soils used for nonirrigated crops respond well to applications of fertilizer.

Some of the limitations and hazards shown in the table cannot be easily overcome, especially *flooding* and *ponding.*

Additional limitations and hazards are as follows:

Excessive permeability.—This limitation causes deep leaching of nutrients and pesticides. The capacity of the soil to retain moisture for plant use is poor.

Potential for ground-water pollution.—This is a hazard in soils that have excessive permeability, hard bedrock, or a water table within the profile.

Limited available water capacity, poor tilth, restricted permeability, and *surface crusting.*—These limitations can be overcome by incorporating green manure crops, manure, or crop residue into the soil; applying a system of conservation tillage; and using conservation cropping systems.

Slope.—Where the slope is more than 8 percent, water erosion and soil blowing may be accelerated unless conservation farming practices are applied.

Salt and sodium content.—In areas where this is a limitation, only salt- and sodium-tolerant crops should be grown.

On irrigated soils the main management concerns are *efficient water use, nutrient management, control of erosion, pest and weed control,* and *timely planting and harvesting* for a successful crop. An irrigation system that provides optimum control and distribution of water at minimum cost is needed. Overirrigation wastes water, leaches plant nutrients, and causes erosion. Also, it can create drainage problems, raise the water table, and increase soil salinity.

Following is an explanation of the criteria used to determine the limitations or hazards.

Erosion by water.—The surface K factor multiplied by the upper slope limit is more than 2 (same as prime farmland criteria).

Excessive permeability.—The upper limit of the permeability range is 6 inches or more within the soil profile.

Flooding.—The component of the map unit is occasionally flooded or frequently flooded.

Limited available water capacity.—The available water capacity calculated to a depth of 60 inches or to a root-limiting layer is 5 inches or less.

Ponding.—Ponding duration is assigned to the component of the map unit.

Potential for ground-water pollution.—The soil has a water table within a depth of 4 feet or hard bedrock within the profile, or permeability is more than 6 inches per hour within the soil.

Restricted permeability.—Permeability is 0.06 inch per hour or less within the soil profile.

Salt content.—The component of the map unit has an electrical conductivity of more than 4 in the surface layer or more than 8 within a depth of 30 inches.

Slope.—The upper slope range of the component of the map unit is more than 8 percent.

Soil blowing.—The wind erodibility index multiplied by the selected high C factor for the survey area and then divided by the T factor is more than 8 for the component of the map unit.

Water table.—The component of the map unit has a water table within a depth of 60 inches.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 7. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials, computer modeling, and demonstrations are also considered *(3).*

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

A high level of management includes maintaining proper soil reaction and fertility levels as indicated by standard soil tests. The application rate of nitrogen for corn on soils that have a yield potential of 125 to 150 bushels per acre should be 140 to 160 pounds per acre. If the yield potential for corn is 100 bushels per acre or less, a rate of 100 to 120 pounds of nitrogen per acre should be used. The application of nitrogen in excess of that required for potential yields generally is not recommended. The excess nitrogen fertilizer that is not utilized by the crop is an unnecessary expense and causes a hazard of water pollution. If corn or cotton is grown after the harvest of soybeans or peanuts, nitrogen rates can be reduced by about 20 to

30 pounds per acre. Because nitrogen can be readily leached from sandy soils, applications may be needed on these soils more than once during the growing season.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 7 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management *(29)*. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by numerals 1 through 8. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have few limitations that restrict their use.

Class 2 soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class 5 soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation.

Class 7 soils have very severe limitations that make them unsuitable for cultivation.

Class 8 soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is in the yields table.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forest land, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management,

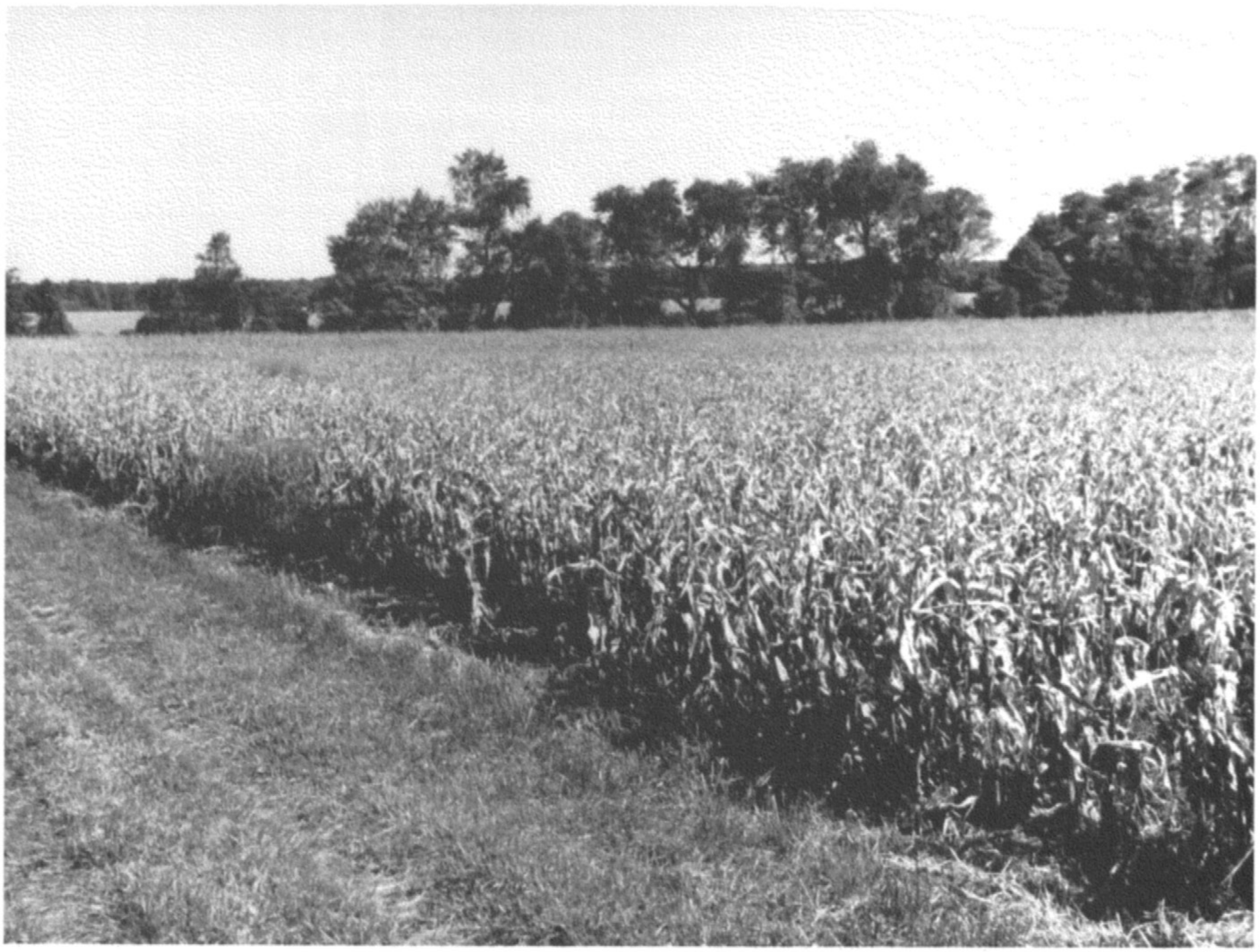


Figure 10.—Mature field corn on Matapeake silt loam, 2 to 5 percent slopes. This soil is a highly productive prime farmland soil.

including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 130,000 acres in the survey area, or nearly 55 percent of the total acreage, meets the soil requirements for prime farmland. Scattered areas of this land are throughout the county (fig. 10).

An additional 45,000 acres, or nearly 19 percent of the survey area, would meet the requirements for prime farmland if an adequate and dependable supply of irrigation water were available or if adequate drainage was provided.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 8. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures used to overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine

whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 5. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Soil Series and Detailed Soil Map Units."

Hydric Soils

In this section, hydric soils are defined and described and the hydric soils in the survey area are listed.

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and hydrology *(4, 8, 18, 27)*. Areas identified as wetlands must meet criteria for each of the characteristics. Undrained hydric soils that have natural vegetation support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses are capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part of the profile *(9)*. These soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. To determine whether a specific soil is a hydric or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Criteria which identify the estimated soil properties that are unique to hydric soils have been established *(10)*. These criteria are used to identify a phase of a soil series that normally is associated with wetlands. The criteria are selected estimated soil properties, which are described in "Soil Taxonomy" *(31, 34)* and in the "Soil Survey Manual" *(33)*.

If soils are wet enough for a long enough period to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators that can be used to make onsite determinations of hydric soils in Queen Anne's County are specified in "Field Indicators of Hydric Soils in the United States" *(13)*.

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. The determination of an appropriate indicator may require a greater depth. Soil scientists excavate and describe the soils deep enough to understand the redoximorphic processes. After completing the soil description, soil scientists can compare the soil features required by each indicator and the conditions observed in the soil and determine which indicators occur. The soil can be identified as a hydric soil if one or more of the approved indicators occur.

This survey can be used to locate probable areas of hydric soils.

The map units in table 9 meet the requirements for hydric soils and also have at least one of the hydric soil indicators. This list can help to plan land uses, but onsite investigation is needed to determine the occurrence of hydric soils on a specific site *(13, 18)*.

Map units consisting of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions of the landform, and map units consisting of nonhydric soils may have inclusions of hydric soils in the lower positions of the landform.

Woodland Management and Productivity

Virgin forest once covered almost all of the survey area, but the trees have been cleared on most of the land suitable for cultivation. In much of the remaining forest land, the soils are too wet or too steep to be used for farming and are used primarily for timber production. The soils in Queen Anne's County can produce high-quality trees if the woodland is properly managed.

About 57,500 acres in the county, or 24 percent of the total acreage, is woodland *(23)*. Most of the forest land is privately owned, in association with farms or homesites. A small portion of the woodland is publicly owned through county, state, or Federal agencies.

The largest areas of woodland are in the Longmarsh-Zekiah and Whitemarsh-Hurlock-Carmichael general soil map units, which are described in the section "General Soil Map Units." The most common trees in the upland areas are white oak, red oak, yellow-poplar, beech, and hickory. The main lowland species are red maple, sweetgum, green ash, willow oak, and blackgum.

Much of the existing commercial forest land could be improved by thinning out mature trees and undesirable species. Protection from fire and control of disease and insects also can improve the stands. The Maryland Department of Natural Resources, Forest Service or the Natural Resources Conservation Service can help to determine specific needs of woodland management.

Table 10 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The

table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce in a pure stand under natural conditions. The number 1 indicates low potential productivity; 2 or 3, moderate; 4 or 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; *F*, a high content of rock fragments in the soil; *L*, low strength; and *N*, snowpack. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, F, L, and N.

In table 10, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, and fire lanes and in log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment and season of use are not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

Plant competition ratings indicate the degree to which undesirable species are expected to invade and grow when openings are made in the tree canopy. The main factors that affect plant competition are depth to the water table and the available water capacity. A rating of *slight* indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can become established without undue competition. A rating of *moderate* indicates that competition may delay the establishment of desirable species. Competition may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to prevent regeneration unless precautionary measures are applied.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *productivity class*. The site index is the

average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *productivity class* represents the yield likely to be produced by the most important trees. This number, expressed as cubic meters per hectare per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

The first species listed under *common trees* for a soil is the indicator species for that soil. It generally is the most common species on the soil and is the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Recreation

Information in this section was provided in part by the Queen Anne's County Department of Parks and Recreation.

Recreational opportunities in Queen Anne's County include many outdoor activities related to the natural resources of the area. Abundant streams and tidal waters, woodland, marshes, and open fields provide opportunities for boating, fishing, hunting, camping, picnicking, hiking, watching birds and other wildlife, and sightseeing. Public lands available for outdoor recreation total more than 6,400 acres and include athletic fields, tennis courts, playgrounds, boat launching facilities and marinas, trails, camp and picnic areas, and a golf course.

The county-owned Terrapin Nature Area, Old Love Point Park, Blue Heron Golf Course, and Romancoke Pier and the state-owned Matapeake State Park are located on Kent Island. Five of the nine public boat ramps in the county are also on Kent Island. The eastern portion of the county includes the Queen Anne's County 4-H Park, the state-managed Wye Island Natural Resources Management Area, and Tuckahoe State Park.

The well drained upland soils, dominantly in the northern and eastern portions of the county, are well suited to recreational facilities and provide excellent habitat for upland wildlife. The wetter woodland and tidal marsh soils are poorly suited to recreational facilities. These soils, however, provide habitat for waterfowl, fish and shellfish, songbirds, game birds, deer, and small game, which are available for hunting or observation.

The soils of the survey area are rated in table 11 according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 11, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in table 11 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 14 and interpretations for dwellings without basements and for local roads and streets in table 13.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand

intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the period of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Wildlife Habitat

The combination of cultivated fields, woodland, wetland, and open water areas in Queen Anne's County provides habitat for many types of wildlife. The county has large populations of deer, fox, squirrels, raccoons, rabbits, muskrats, and birds.

Generally, the soils of the county are highly suited to wildlife habitat. Approximately 70 percent of the soils are well suited to openland and woodland wildlife. Most of these soils are in the Fort Mott-Galestown, Ingleside-Pineyneck-Unicorn, and Matapeake-Mattapex-Nassawango general soil map units. Soils well suited to habitat for wetland wildlife cover approximately 30 percent of the land area in the county. These soils are primarily in the Longmarsh-Zekiah and Whitemarsh-Hurlock-Carmichael general soil map units. The county includes about 4,000 acres of tidal marshes, located primarily in the Honga-Bestpitch general soil map unit (fig. 11). These areas provide food, cover, and breeding sites for many species of fish, shellfish, insects, mammals, and birds. The general soil map units are described in the section "General Soil Map Units."

Management that protects waters and wetlands from pollution and maintains of a variety of wildlife cover, nesting sites, and food sources helps to maintain and enhance the diversity of wildlife in the county.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 12, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat. The ratings in table 12 are intended to be used as a guide and are not site specific. Onsite investigation is needed for individual management plans.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, millet, wheat, oats, sunflowers, soybeans, sorghum, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are lovegrass, lespedeza, bromegrass, orchardgrass, timothy, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness,

Figure 11.—High-tide flooding on Bestpitch peat along Island Creek. The trees protect the steeply sloping areas of Downer soils, 15 to 30 percent slopes, from erosion.

surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, pokeweed, goldenrod, butterflyweed, switchgrass, bluegrass, redtop, gamagrass, and panicgrass.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, locust, holly, dogwood, and hickory.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are loblolly pine, scrub pine, white pine, Virginia pine, spruce, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice,

arrow-arrum, saltgrass, cordgrass, rushes, sedges, ferns, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, mourning dove, field sparrow, deer, cottontail rabbit, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, Delmarva fox squirrel, and various species of small mammals, reptiles, and songbirds.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas that include both tidal and nontidal wetlands. The soils of these wetlands provide a storage medium for the retention of nutrients (nitrogen and phosphorus), floodwaters, sediment, and potential pollutants. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, osprey, bald eagle, muskrat, raccoon, beaver, many species of songbirds, and small reptiles, amphibians, and mammals.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 13 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns, landscaping, and golf fairways. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or a very firm, dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the high water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. Depth to a high water table, depth to bedrock, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock, depth to a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns, landscaping, and golf fairways require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, depth to a high water table, depth to bedrock, and the available water capacity in the upper 40 inches affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established. Soil tests are essential to determine liming and fertilizer needs. Help in making soil tests or in deciding what soil additive, if any, should be used can be obtained from the office of the Queen Anne Soil Conservation District or the local office of the Cooperative Extension Service.

Sanitary Facilities

Table 14 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 14 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that

part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. The animal waste lagoons commonly used in farming operations are not considered in the ratings. They are generally deeper than the lagoons referred to in the table and rely on anaerobic bacteria to decompose waste materials.

Table 14 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope or bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 14 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 15 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of

roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the high water table is more than 3 feet. Soils rated *fair* have more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the high water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a high water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 15, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale, siltstone, and weathered granite saprolite, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a high water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a high water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are naturally fertile or respond well to fertilizer and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or stones, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or stones, have slopes of more than 15 percent, or have a high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 16 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not

favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives the restrictive features that affect each soil for drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area. Ponds that are less than about 2 acres in size are not shown on the maps because of the scale of mapping.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, mica, or salts or sodium. Depth to a high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table and permeability of the aquifer. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or to other layers that affect the rate of water movement, permeability, depth to a high water table or depth of standing water if the soil is subject to ponding, slope, susceptibility to flooding, subsidence of organic layers, and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

Drainage may be a major management consideration in some areas. Management of drainage in conformance with regulations concerning wetlands may require special permits and extra planning. The local office of the Natural Resources Conservation Service should be contacted for identification of hydric soils and potential wetlands.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to a high water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock. The performance of a system is affected by the availability of suitable irrigation water, the depth of the root zone, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. A hazard of soil blowing, a low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 17, Parts I and II, give estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Detailed Soil Map Units."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages, by weight, of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, by volume, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20, or higher, for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3

inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 18 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence the shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of movement of water through the soil when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time. It is the difference between the amount of soil water at field moisture capacity and the amount at wilting point.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling

of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; *high*, 6 to 9 percent; and *very high*, more than 9 percent.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.64. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. The soils assigned to group 1 are the most susceptible to soil blowing, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.

8. Soils that are not subject to soil blowing because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 18, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Tables 19 and 20 give estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. In table 19, soils are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep or very deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep to very deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 19, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 19 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as none, rare, occasional, or frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of flooding is more than 50 percent in any year). *Common* is used when occasional and frequent classes are grouped for certain purposes. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered is local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. Indicated in table 19 are the depth to the high water table; the kind of water table—that is, *perched* or *apparent*; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 19.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Two numbers in the column showing depth to the high water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Table 20 shows *subsidence*, which is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors. Not shown in the table is subsidence caused by an imposed surface load or by the withdrawal of ground water throughout an extensive area as a result of lowering the water table.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the high water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion

of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate,* or *high.* It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Physical and Chemical Analyses of Selected Soils

The results of physical analysis of several typical pedons in the survey area are given in table 21 and the results of chemical analysis in table 22. The data are for soils sampled at carefully selected sites. Unless otherwise indicated, the pedons are typical of the series and are described in the section "Soil Series and Detailed Soil Map Units." Soil samples were analyzed by the National Soil Survey Laboratory, Lincoln, Nebraska, and the Pedology Research Laboratory, University of Maryland, as noted.

Most determinations, except those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an ovendry basis. The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods *(32).*

Sand—(0.05-2.0 mm fraction) weight percentages of material less than 2 mm (3A1).

Silt—(0.002-0.05 mm fraction) pipette extraction, weight percentages of all material less than 2 mm (3A1).

Clay—(fraction less than 0.002 mm) pipette extraction, weight percentages of material less than 2 mm (3A1).

Water retained—pressure extraction, percentage of ovendry weight of less than 2 mm material; 1/3 or 1/10 bar (4B1), 15 bars (4B2).

Water-retention difference—between 1/3 bar and 15 bars for whole soil (4C1).

Bulk density—of less than 2 mm material, saran-coated clods field moist (4A1a), 1/3 bar (4A1d), ovendry (4A1h).

Organic carbon—wet combustion. Walkley-Black modified acid-dichromate, ferric sulfate titration (6A1c).

Extractable cations—ammonium acetate pH 7.0, atomic absorption; calcium (6N2e), magnesium (6O2d), sodium (6P2b), potassium (6Q2b).

Extractable acidity—barium chloride-triethanolamine IV (6H5a).

Cation-exchange capacity—ammonium acetate, pH 7.0, steam distillation (5A8b).

Base saturation—sum of cations, TEA, pH 8.2 (5C3).

Reaction (pH)—1:1 water dilution (8C1f).

Engineering Index Test Data

Table 23 shows laboratory test data for four pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil Series and Detailed Soil Map Units." The soil samples were tested by the National Soil Survey Laboratory in Lincoln, Nebraska.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 422 (ASTM), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 4318 (ASTM); Plasticity index—T 90 (AASHTO), D 4318 (ASTM); Moisture density—T 99 (AASHTO), D 698 (ASTM); Specific gravity—T 100 (AASHTO), D 854 (ASTM); California bearing ratio—T 193 (AASHTO), D 1883 (ASTM); and Shrinkage—T 92 (AASHTO), D 427 (ASTM).

References

(1) American Association of State Highway and Transportation Officials. 1986. Standard specifications for highway materials and methods of sampling and testing. Ed. 14, 2 vols.

(2) American Society for Testing and Materials. 1993. Standard classification of soils for engineering purposes. ASTM Stand. D 2487.

(3) Bandel, V.A., and E.A. Heger. 1994. Maryland's agronomic soil capability assessment program. Univ. Md. Coop. Ext. Serv.

(4) Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildl. Serv. FWS/OBS-79/31.

(5) Darmody, R.G., and J.E. Foss. 1978. Tidal marsh soils of Maryland. Univ. Md. Agric. Exp. Stn., MP 930.

(6) Darmody, R.G., and J.E. Foss. 1979. Soil-landscape relationships of tidal marshes of Maryland. Soil Sci. Soc. Am. J. 43:534-541.

(7) Emory, Frederic. 1950. Queen Anne's County, Maryland: Its history and development.

(8) Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. U.S. Army Engin. Waterways Exp. Stn., Vicksburg, MS, Tech. Rep. Y-87-1.

(9) Federal Register. July 13, 1994. Changes in hydric soils of the United States.

(10) Federal Register. February 24, 1995. Hydric soils of the United States.

(11) Foss, J.E., D.S. Fanning, F.P. Miller, and D.P. Wagner. 1978. Loess deposits of the Eastern shore of Maryland. Soil Sci. Soc. Am. J. 42:329-334.

(12) Hansen, Harry J., and Jonathan Edwards, Jr. 1986. The lithology and distribution of pre-Cretaceous basement rocks beneath the Maryland Coastal Plain. Md. Geol. Surv., Rep. of Invest. No. 44.

(13) Hurt, G.W., P.M. Whited, and R.F. Pringle, eds. 1996. Field indicators of hydric soils in the United States. U.S. Dep. Agric., Nat. Resour. Conserv. Serv.

(14) Mack, Frederick K. 1983. Preliminary analysis of geohydrologic data from test wells drilled near Chester, on Kent Island, Queen Anne's County, Maryland. Md. Geol. Surv., Open File Rep. No. USGS 82-854.

(15) Maryland Agriculture Statistics Service. October 1997. Queen Anne's County census of agriculture.

(16) Maryland Cooperative Extension Service. 1992. Agricultural profile of Queen Anne's County. Md. Agric. Stat. Serv., Annapolis, Md.

(17) Maryland Geological Survey. 1926. Queen Anne's County.

(18) National Research Council. 1995. Wetlands: Characteristics and boundaries.

(19) Nickerson, John E. 1989. Queen Anne's County groundwater protection report.

(20) Overbeck, Robert M., Turbit H. Slaughter, and Arthur E. Hulme. 1958. The water resources of Cecil, Kent, and Queen Anne's Counties. State of Md. Bd. Nat. Resour. Bull. 21.

(21) Owens, J.P., and C.S. Denny. 1979. Upper Cenozoic deposits of the central Delmarva Peninsula, Maryland and Delaware. U.S. Geol. Surv. Prof. Pap. 1067-A.

(22) Owens, J.P., and C.S. Denny. 1986. Geologic map of Talbot County. Md. Geol. Surv., Md. Dep. Nat. Resour.

(23) Powell, Douglas S., and Neal P. Kingsley. 1980. The forest resources of Maryland. U.S. Dep. Agric. For. Serv. Bull. NE-61.

(24) Queen Anne's Conservation Association, Inc. 1983. Your water supply—development committee.

(25) Rabenhorst, Martin C., and Diane Shields. 1996. Mineralogical determination for family placement: Our experience on the Maryland Coastal Plain. Soil Surv. Hor. 37:59-65.

(26) Stolt, M.H., and M.C. Rabenhorst. 1987. Carolina bays on the Eastern shore of Maryland: II. Distribution and origin. Soil Sci. Soc. Am. J. 51:399-405.

(27) Tiner, R.W., Jr. 1985. Wetlands of Delaware. Coop. Publ., U.S. Fish and Wildl. Serv., Newton Corner, MA, and Delaware Dep. of Nat. Resour. and Environ. Control, Wetlands Sect., Dover, DE.

(28) United States Department of Agriculture, Soil Conservation Service. National soil survey handbook. Soil Surv. Staff. (Available in the State Office of the Natural Resources Conservation Service at Annapolis)

(29) United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Dep. Agric. Handb. 210.

(30) United States Department of Agriculture, Soil Conservation Service. 1966. Soil survey of Queen Anne's County, Maryland.

(31) United States Department of Agriculture, Soil Conservation Service. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. U.S. Dep. Agric. Handb. 436.

(32) United States Department of Agriculture, Soil Conservation Service. 1991. Soil survey laboratory methods manual. Soil Surv. Inv. Rep. 42.

(33) United States Department of Agriculture, Soil Conservation Service. 1993. Soil survey manual. Soil Surv. Staff, U.S. Dep. Agric. Handb. 18.

(34) United States Department of Agriculture, Soil Conservation Service. 1994. Keys to soil taxonomy. 6th ed. Soil Surv. Staff, Soil Manage. Support Serv. Tech. Monogr. 19.

Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces. Generally, cool aspects are north- to east-facing and warm aspects are south- to west-facing.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	more than 5.2

Backslope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Backslopes in profile are commonly steep, are linear, and may or may not include cliff segments.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Board foot. A unit of measure of the wood in lumber, logs, or trees. The amount of wood in a board 1 foot wide, 1 foot long, and 1 inch thick before finishing.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breast height. An average height of 4.5 feet above

the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channeled. Refers to a streambed in which meandering, repeated branching, and convergence of streams, either active or abandoned, have created deeply incised cuts in alluvial material.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clayey soil. Silty clay, sandy clay, or clay.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Clearcutting. A method of forest harvesting that removes the entire stand of trees in one cutting. The stand is reproduced artificially or by natural seeding from adjacent stands.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Closed depression. A low area completely surrounded by higher ground and having no natural outlet.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

Codominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.

Commercial forest. Forest land capable of producing 20 cubic feet or more per acre per year at the culmination of mean annual increment.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a

plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Congeliturbate. Soil material disturbed by frost action.

Conglomerate. A coarse-grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Consolidated sandstone. Sandstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry, are not easily crushed, and cannot be textured by the usual field method.

Consolidated shale. Shale that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coppice dune. A small dune of fine-grained soil material stabilized around shrubs or small trees.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deep soil. A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Delta. A body of alluvium having a surface that is nearly flat and fan shaped; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a

crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Dominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained.* These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. A land area that is lower in elevation than surrounding areas and in which water collects and is drained to a closed depression or lake or to a drainageway at a lower elevation. A drainageway may have distinctly incised channels at its upper reaches or throughout its course.

Draw. A small stream valley that generally is more open and has broader bottom land than a ravine or gulch.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Dune. A mound, ridge, or hill of loose, windblown granular material (generally sand), either bare or covered with vegetation.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Exposed material is hard or soft bedrock. Areas identified on the detailed soil maps by a special symbol typically are long, narrow bands that are less than 2 acres in size. Synonym: scarp.

Estuarine. Term relating to marsh soils that may contain mineral material with high *n* value that was deposited by tidally influenced streams in a quiescent environment.

Even-aged. Refers to a stand of trees in which only small differences in age occur between individual trees. A range of 20 years is allowed.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sodium (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Excess sulfur (in tables). Excessive amount of sulfur in the soil. The sulfur causes extreme acidity if the soil is drained, and the growth of most plants is restricted.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited

rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. An area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Fluviomarine. Of or pertaining to material deposited by oceans and reworked and deposited by streams after exposure.

Footslope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors which differentiate it from other stands.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A very small channel with steep sides cut by running water and through which water ordinarily runs only after rainfall, icemelt, or snowmelt. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

Gypsum. A mineral consisting of hydrous calcium sulfate.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head out. To form a flower head.

Heavy metals. Inorganic substances that are solid at ordinary temperatures and are not soluble in water. They form oxides and hydroxides that are basic. Examples are copper, iron, cadmium, zinc, manganese, lead, and arsenic.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn that are used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above the surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low

0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On pasture, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions. Low-chroma zones that have a low content of iron and manganese oxide because of chemical reduction and removal but also have a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation in the survey area include:

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lamellae. Zones of clay accumulation caused by soil-forming processes and occurring as horizontal bands.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy soil. Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

Loess. Fine-grained material, dominantly of silt-sized particles, deposited by the wind.

Low-residue crops. Such crops as corn that are used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mean annual increment. The average annual volume of a stand of trees from the year of origin to the age under consideration.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Merchantable trees. Trees that are of sufficient size to be economically processed into wood products.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately deep soil. A soil that is 20 to 40 inches

deep to bedrock or other material that restricts the penetration of plant roots.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil (mottles). Irregular spots of different colors that vary in number and size. They result from impeded drainage and poor aeration or as a result of weathering of geologic material. Redoximorphic features are a type of mottle resulting from conditions of wetness. Lithochromic or lithomorphic mottles are mottles which retain colors of the original geologic materials. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neck. A narrow strip of land that is connected to a larger body of land but is bounded on both sides by water.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

***n* value.** Refers to the relationship between percentage of water under field conditions and percentages of inorganic clay and humus. Soils that have a high *n* value (more than 0.7) are very fluid and are never dry below field capacity.

Observed rooting depth. Depth to which roots have been observed to penetrate.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Overstory. The portion of the trees in a forest stand forming the upper crown cover.

Oxbow. The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Panne. A small pond located on a tidal marsh, commonly having a higher content of salt than the surrounding areas of marsh.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment. A thin layer of alluvial material that mantles an erosion surface and has been transported to its present position from higher areas of the erosion surface.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water

through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay and quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is also exposed to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse-grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate weather conditions and soil moisture conditions and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Quartzite, metamorphic. Rock consisting mainly of quartz that formed through recrystalization of quartz-rich sandstone or chert.

Quartzite, sedimentary. Very hard but unmetamorphosed sandstone consisting chiefly of quartz grains.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. Nodules,

concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. They indicate chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. They indicate the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation. Descriptive terms for concentrations and depletions are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Regeneration. The new growth of a natural plant community, developing from seed.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relict stream terrace. One of a series of platforms in or adjacent to a stream valley that formed prior to the current stream system.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Riser. The relatively short, steeply sloping area below a terrace tread that grades to a lower terrace tread or base level.

Riverwash. Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop. An area of exposed bedrock in a map unit that has less than 0.1 percent exposed bedrock. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Rubble land. Areas that have more than 90 percent of the surface covered by stones or boulders. Voids contain no soil material and virtually no vegetation other than lichens. Areas commonly are at the base of mountain slopes, but some are on mountain slopes as deposits of cobbles, stones, and boulders resulting from Pleistocene glaciation or periglacial phenomena.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salinity. The electrical conductivity of a saline soil. It is expressed, in millimhos per centimeter, as follows:

Nonsaline	0 to 4
Slightly saline	4 to 8
Moderately saline	8 to 16
Strongly saline	more than 16

Salty water (in tables). Water that is too salty for consumption by livestock.

Sand. As a soil separate, individual rock or mineral fragments ranging from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sandy soil. Sand or loamy sand.

Sapric soil material (muck). The most highly

decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite. Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Saw logs. Logs of suitable size and quality for the production of lumber.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Scarp. An escarpment, cliff, or steep slope of considerable extent along the margin of a terrace.

Scribner's log rule. A method of estimating the number of board feet that can be cut from a log of a given diameter and length.

Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Semiconsolidated sedimentary beds. Soft geologic sediments that disperse when fragments are placed in water. The fragments are hard or very hard when dry. Determining the texture by the usual field method is difficult.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shallow soil. A soil that is 10 to 20 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder slope. The uppermost inclined surface at the top of a hillside. It is the transition zone from the backslope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Skid trails. The paths left by skidding logs and the bulldozer or tractor used to pull them.

Slash. The branches, bark, treetops, reject logs, and broken or uprooted trees left on the ground after logging.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical

distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 2 percent
Gently sloping	2 to 5 percent
Moderately sloping	5 to 10 percent
Strongly sloping	10 to 15 percent
Steep	15 to 30 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil classification terminology. Taxonomic terms are briefly described as follows:

Acid.—Reaction class for mineral soils. The pH is less than 5.0 in 0.01 M calcium chloride solution in part of the subsoil.

Alfs.—Formative element indicating the Alfisols order. These soils have an argillic zone with a moderate or high proportion of the exchange capacity occupied by calcium, magnesium, sodium, and potassium, considered collectively, and do not have a thick, dark surficial zone.

Aqu.—There is evidence of free water at or very near the soil surface for significant periods of time during the growing season while parts of the soil have temperatures high enough to permit the growth of micro-organisms.

Aquic.—There is evidence of free water beneath the surficial soil zone during the growing season. Soil depth is shallow enough that free water affects plant growth, but the soils are less wet than *Aqu.*

Arenic.—There is a surficial soil zone that has a sandy particle-size class 20 to 40 inches thick.

Argillic.—There is a zone of clay accumulation caused by soil-forming processes that is a major classification criterion because it is sufficiently expressed.

Clayey.—More than 35 percent clay and less than 35 percent, by volume, rock fragments. Composition pertains to a subsoil zone that occurs in different positions and has different thicknesses among soils but is commonly within the rooting depth if water is not a limiting factor.

Coarse-loamy.—Less than 18 percent clay and more than 15 percent material coarser than very fine sand and finer than cobbles. Composition pertains to a subsoil zone that occurs in different positions and has different thicknesses among soils but is commonly within the rooting depth if water is not a limiting factor.

Coarse-silty.—Less than 18 percent clay and less than 15 percent material coarser than very fine sand and finer than cobbles. Composition pertains to a subsoil zone that occurs in different positions and has different thicknesses among soils but is commonly within the rooting depth if water is not a limiting factor.

Coated.—Sandy particle-size class that has appreciable amounts of finer textured grains (silt and clay).

Dysic.—Reaction class for Histosols. The pH in 0.01 M calcium chloride solution before drying is less than 4.5 in part of the subsoil.

Ents.—Formative element indicating the Entisols order. These soils do not have appreciable horizon development and commonly are very young.

Euic.—Reaction class for Histosols. The pH in 0.01 M calcium chloride solution before drying is 4.5 or more in part of the subsoil.

Family.—A group of soils having similar kinds and sequences of layers that specifies particle size, mineralogy, chemistry, and mean annual temperature. Particle size, mineralogy, and chemistry pertain to a subsoil zone that occurs in different positions and has different thicknesses among soils but is commonly within the rooting depth if water is not a limiting factor.

Fine-loamy.—18 to 35 percent clay and 15 percent or more material coarser than very fine sand and finer than cobbles. Composition pertains to a subsoil zone that occurs in different positions and has different thicknesses among soils but is commonly within the rooting depth if water is not a limiting factor.

Fine-silty.—18 to 35 percent clay and less than 15 percent material coarser than very fine sand and finer than cobbles. Composition pertains to a subsoil zone that occurs in different positions and has different thicknesses among soils but is commonly within the rooting depth if water is not a limiting factor.

Fluv.—Soil material which was deposited by water

so recently that the original organization and content of organic matter are retained.
Great group.—The third categorical level of the taxonomic system. Terms of this group consist of a single word composed of three formative elements, such as *Hap aqu ents*. The major genetic process is defined but not the kind and sequence of all major zones.
Hapl.—None of the sets of properties that are used for great groups are expressed well enough to affect the classification.
Hem.—Soils that are composed of organic material in an intermediate state of decomposition.
Histo.—Parent material of the soil is dominantly organic.
Histosols.—Soils that formed in dominantly organic material.
Hydr.—Mineral soils that are permanently saturated with water and have a low bulk density.
Ists.—Formative element indicating the Histosols order. These soils dominantly consist of organic matter.
Loamy.—Less than 35 percent, by volume, rock fragments and excluding sandy and clayey textures. Composition pertains to a subsoil zone that occurs in different positions and has different thicknesses among soils but is commonly within the rooting depth if water is not a limiting factor.
Medi.—Organic soils (Histosols) that have mean annual soil temperatures above 47 degrees F and that have differences of more than 8 degrees F between summer and winter temperatures.
Mesic.—The mean annual soil temperature is between 47 and 59 degrees F.
Mixed.—Term describing mineralogy. If the soil has less than 35 percent clay in the relevant zone, the term indicates that appreciable amounts of weatherable minerals occur in the sand and silt. If the soil has 35 percent or more clay, the term indicates that two or more kinds of clay minerals occur in appreciable amounts.
Nonacid.—Reaction class for mineral soils. The pH is 5.0 or more in 0.01 M calcium chloride solution in part of the subsoil.
Ochr.—The surficial soil zone is light colored and does not meet the requirements for several other kinds of surficial zones.
Order.—The highest level in the classification system. There are 11 orders.
Orth.—The soils do not meet criteria for any of the property sets used to subdivide the order.
Psamm.—Sandy or sandy skeletal soil material is at depths of 10 to 40 inches.
Psammentic.—The argillic horizon has a sandy particle-size class or consists entirely of thin lamellae, or both.
Quartzi.—The sand fraction is 95 percent or more insoluble crystalline minerals (mainly quartz) that do not weather to liberate iron or aluminum.
Sandy.—Less than 35 percent, by volume, rock fragments and material coarser than loamy very fine sand. Composition pertains to a subsoil zone that occurs in different positions and has different thicknesses among soils but is commonly within the rooting depth if water is not a limiting factor.
Sapr.—Organic soils (Histosols) that are composed of highly decomposed material.
Series.—The concepts that specify the kind and sequence of major soil zones in a genetic sense and the composition of these zones. The series is commonly named for communities near the location where the soil was first formally described for the records of the soil survey.
Siliceous.—Term describing mineralogy. The soils are more than 90 percent, by weight, silica and other durable minerals that are resistant to weathering.
Sols.—Term meaning soils.
Subgroup.—The classification level that encompasses the major kinds and sequences of soil horizons in a genetic sense.
Suborder.—The second categorical level of the taxonomic system. The term connotes a formative element from the name of the order and something about diagnostic properties of the soils.
Sulf.—Occurrence of sulfides within the upper 40 inches of an organic soil.
Terric.—Organic soils (Histosols) that generally have continuous mineral material within a depth of 50 inches. The term also includes some soils that have discontinuous mineral layers within a depth of 50 inches.
Thapto-Histic.—There is a zone of buried organic material that is more than 8 inches thick and whose upper boundary is within 40 inches of the surface.
Typic.—The soils do not meet criteria of any of the property sets used to subdivide at the subgroup level.
Ud.—Commonly moist soils. During the growing season, these soils do not have free water at shallow depths over extended periods of time (see *Aqu*) and commonly have available water within the rooting depth of common annual crops.
Udi.—Term synonymous with *Ud.*
Ults.—Formative element indicating the Ultisols

order. These soils have an argillic zone with a low or very low proportion of the exchange capacity occupied by calcium, magnesium, sodium, and potassium, considered collectively.

Umbr.—Thick, dark, highly organic mineral surficial zone that has a low or moderate proportion of the exchange capacity occupied by calcium, magnesium, sodium, and potassium, considered collectively.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Species. A single, distinct kind of plant or animal having certain distinguishing characteristics.

Stone line. A concentration of rock fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stream channel. The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor that was produced during a former stage of erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Summit. A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Swamp. A saturated, very poorly drained area that is intermittently or permanently covered by water. Swamps are dominantly vegetated by shrubs and trees.

Tailwater. The water directly downstream of a structure.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a

field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The outermost inclined surface at the base of a hill; part of a footslope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Trafficability. The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.

Tread. The relatively flat terrace surface that was cut or built by stream or wave action.

Understory. The trees and other woody species growing under a more or less continuous cover of branches and foliage formed collectively by the upper portions of adjacent trees and other woody growth.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Urban land. An area where more than 75 percent of the surface is covered by asphalt, concrete, buildings, or other structures.

Valley. An elongated depressional area primarily developed by stream action.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Very deep soil. A soil that is more than 60 inches deep to bedrock or other material that restricts the penetration of plant roots.

Very shallow soil. A soil that is less 10 inches deep to bedrock or other material that restricts the penetration of plant roots.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and to divert water off and away from the road surface. Water bars can be easily driven over if they are constructed properly.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse-grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

Table 1.—Temperature and Precipitation

(Recorded in the period 1961-85 at Centreville, Maryland)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	41.4	24.2	32.8	66	-1	38	3.58	2.15	4.86	7	6.8
February----	44.5	25.5	35.0	70	3	54	2.91	1.62	4.05	6	7.8
March-------	54.8	34.2	44.5	79	15	190	3.74	2.21	5.12	6	3.0
April-------	65.2	42.1	53.6	86	25	412	3.37	1.88	4.68	6	.2
May---------	75.3	51.7	63.5	91	34	723	3.77	2.06	5.28	7	.0
June--------	83.3	60.6	72.0	95	45	956	4.03	2.28	5.59	5	.0
July--------	87.0	64.9	76.0	96	50	1,105	3.32	1.71	4.73	5	.0
August------	86.1	63.5	74.8	95	46	1,075	3.86	1.80	5.64	5	.0
September---	80.1	56.7	68.4	94	37	848	3.65	1.82	5.24	5	.0
October-----	69.1	45.6	57.3	84	25	528	3.14	1.85	4.55	4	.0
November----	58.0	37.7	47.8	78	19	257	3.29	1.37	4.92	4	.6
December----	47.4	29.7	38.6	70	9	81	3.88	2.09	5.46	6	3.0
Yearly:											
Average---	66.0	44.7	55.4	---	---	---	---	---	---	---	---
Extreme---	100	-13	---	97	-3	---	---	---	---	---	---
Total-----	---	---	---	---	---	6,267	42.54	33.11	46.95	66	21.4

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Table 2.—Freeze Dates in Spring and Fall

(Recorded in the period 1961-85 at Centreville, Maryland)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 1	Apr. 13	May 1
2 years in 10 later than--	Mar. 27	Apr. 9	Apr. 26
5 years in 10 later than--	Mar. 16	Apr. 1	Apr. 18
First freezing temperature in fall:			
1 year in 10 earlier than--	Nov. 1	Oct. 15	Oct. 5
2 years in 10 earlier than--	Nov. 7	Oct. 20	Oct. 11
5 years in 10 earlier than--	Nov. 18	Oct. 31	Oct. 22

Table 3.—Growing Season

(Recorded in the period 1961-85 at Centreville, Maryland)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	216	192	165
8 years in 10	225	199	172
5 years in 10	244	213	186
2 years in 10	262	226	199
1 year in 10	272	233	206

Table 4.--Classification of the Soils

Soil name	Family or higher taxonomic class
Bestpitch	Clayey, mixed, euic, mesic Terric Sulfihemists
Butlertown	Fine-silty, mixed, mesic Typic Fragiudults
Carmichael	Coarse-loamy, mixed, mesic Typic Endoaquults
Corsica	Fine-loamy, mixed, mesic Typic Umbraquults
Downer	Coarse-loamy, siliceous, mesic Typic Hapludults
Fallsington	Fine-loamy, mixed, mesic Typic Endoaquults
Fort Mott	Loamy, siliceous, mesic Arenic Hapludults
Galestown	Sandy, siliceous, mesic Psammentic Hapludults
Greenwich	Coarse-loamy, mixed, mesic Typic Hapludults
Hammonton	Coarse-loamy, siliceous, mesic Aquic Hapludults
Honga	Loamy, mixed, euic, mesic Terric Sulfihemists
Hurlock	Coarse-loamy, siliceous, mesic Typic Endoaquults
Ingleside	Coarse-loamy, siliceous, mesic Typic Hapludults
Kentuck	Fine-silty, mixed, mesic Typic Umbraquults
Longmarsh	Coarse-loamy, siliceous, acid, Fluvaquentic Humuaquepts
Matapeake	Fine-silty, mixed, mesic Typic Hapludults
Mattapex	Fine-silty, mixed, mesic Aquic Hapludults
Nassawango	Fine-silty, mixed, mesic Typic Hapludults
Othello	Fine-silty, mixed, mesic Typic Endoaquults
Pineyneck	Coarse-loamy, mixed, mesic Aquic Hapludults
Puckum	Dysic, mesic Typic Medisaprists
Sassafras	Fine-loamy, siliceous, mesic Typic Hapludults
Sulfaquents	Sulfaquents
Udorthents	Udorthents
Unicorn	Coarse-loamy, mixed, mesic Typic Hapludults
Whitemarsh	Fine-loamy, mixed, mesic Typic Albaquults
Zekiah	Coarse-loamy, siliceous, acid, mesic Typic Fluvaquents

Table 5.—Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
Bp	Bestpitch peat	1,855	0.7
Ca	Carmichael loam	16,072	6.3
Co	Corsica mucky loam	6,899	2.7
DhC	Downer-Hammonton sandy loams, 5 to 10 percent slopes	407	0.2
DoB	Downer sandy loam, 2 to 5 percent slopes	3,441	1.3
DOE	Downer soils, 15 to 30 percent slopes	2,494	1.0
DUD	Downer and Unicorn soils, 10 to 15 percent slopes	2,052	0.8
Fg	Fallsington loam	1,248	0.5
FmA	Fort Mott loamy sand, 0 to 2 percent slopes	422	0.2
FmB	Fort Mott loamy sand, 2 to 5 percent slopes	937	0.4
GfB	Galestown-Fort Mott loamy sands, 0 to 5 percent slopes	2,713	1.1
GfC	Galestown-Fort Mott loamy sands, 5 to 10 percent slopes	312	0.1
GrA	Greenwich loam, 0 to 2 percent slopes	207	0.1
HnA	Hammonton sandy loam, 0 to 2 percent slopes	5,829	2.3
HnB	Hammonton sandy loam, 2 to 5 percent slopes	4,536	1.8
Ho	Honga peat	2,159	0.8
Hr	Hurlock sandy loam	16,210	6.3
IgA	Ingleside sandy loam, 0 to 2 percent slopes	2,672	1.0
IgB	Ingleside sandy loam, 2 to 5 percent slopes	38,175	14.9
IgC	Ingleside sandy loam, 5 to 10 percent slopes	6,721	2.6
Kn	Kentuck mucky silt loam	2,006	0.8
Lo	Longmarsh mucky loam, 0 to 1 percent slopes	3,886	1.5
LZ	Longmarsh and Zekiah soils, 0 to 2 percent slopes	7,274	2.8
MkA	Matapeake silt loam, 0 to 2 percent slopes	605	0.2
MkB	Matapeake silt loam, 2 to 5 percent slopes	8,084	3.1
MkC	Matapeake silt loam, 5 to 10 percent slopes	394	0.1
MtA	Mattapex-Butlertown silt loams, 0 to 2 percent slopes	11,860	4.6
MtB	Mattapex-Butlertown silt loams, 2 to 5 percent slopes	5,011	1.9
MtC	Mattapex silt loam, 5 to 10 percent slopes	594	0.2
M-W	Miscellaneous water	11	*
NsA	Nassawango silt loam, 0 to 2 percent slopes	4,846	1.9
NsB	Nassawango silt loam, 2 to 5 percent slopes	3,328	1.3
Ot	Othello silt loam	10,083	3.9
PiA	Pineyneck silt loam, 0 to 2 percent slopes	9,425	3.7
PiB	Pineyneck silt loam, 2 to 5 percent slopes	6,686	2.6
PiC	Pineyneck silt loam, 5 to 10 percent slopes	248	0.1
Pk	Puckum mucky peat	158	0.1
UbB	Udorthents, borrow area, 0 to 5 percent slopes	403	0.2
UdB	Udorthents and Sulfaquents, dredge spoil, 0 to 5 percent slopes	34	*
UlB	Udorthents, landfill, 0 to 5 percent slopes	51	*
UoA	Unicorn silt loam, 0 to 2 percent slopes	574	0.2
UoB	Unicorn silt loam, 2 to 5 percent slopes	2,275	0.9
Ur	Urban land	350	0.1
UsA	Unicorn-Sassafras loams, 0 to 2 percent slopes	3,815	1.5
UsB	Unicorn-Sassafras loams, 2 to 5 percent slopes	18,699	7.3
UsC	Unicorn-Sassafras loams, 5 to 10 percent slopes	3,843	1.5
W	Water	18,700	7.3
Wh	Whitemarsh silt loam	18,096	7.0
	Total	256,700	100.0

* Less than 0.1 percent.

Table 6.—Main Cropland Limitations and Hazards

(See text for a description of the limitations and hazards listed in this table)

Map symbol and soil name	Limitations or hazards
Bp: Bestpitch	Acidity (soil needs lime), flooding, ponding, restricted permeability, salt content, water table.
Ca: Carmichael	Acidity (soil needs lime), restricted permeability, soil blowing, water table.
Co: Corsica	Acidity (soil needs lime), ponding, soil blowing, water table.
DhC:	
Downer	Acidity (soil needs lime), water erosion, excessive permeability, slope, soil blowing.
Hammonton	Acidity (soil needs lime), water erosion, slope, soil blowing, water table.
DoB: Downer	Acidity (soil needs lime), excessive permeability, soil blowing.
DOE: Downer	Acidity (soil needs lime), water erosion, excessive permeability, limited available water capacity, slope, soil blowing.
DUD:	
Downer	Acidity (soil needs lime), water erosion, excessive permeability, limited available water capacity, slope, soil blowing.
Unicorn	Acidity (soil needs lime), water erosion, slope, soil blowing, water table.

Table 6.—Main Cropland Limitations and Hazards—Continued

Map symbol and soil name	Limitations or hazards
Fg: Fallsington	Acidity (soil needs lime), soil blowing, water table.
FmA: Fort Mott	Acidity (soil needs lime), excessive permeability, soil blowing.
FmB: Fort Mott	Acidity (soil needs lime), excessive permeability, soil blowing.
GfB:	
Galestown	Acidity (soil needs lime), excessive permeability, limited available water capacity, soil blowing.
Fort Mott	Acidity (soil needs lime), excessive permeability, soil blowing.
GfC:	
Galestown	Acidity (soil needs lime), excessive permeability, limited available water capacity, slope, soil blowing.
Fort Mott	Acidity (soil needs lime), excessive permeability, slope, soil blowing.
GrA: Greenwich	Acidity (soil needs lime), soil blowing.
HnA: Hammonton	Acidity (soil needs lime), soil blowing, water table.
HnB: Hammonton	Acidity (soil needs lime), soil blowing, water table.
Ho: Honga	Acidity (soil needs lime), flooding, ponding, restricted permeability, salt content, water table.
Hr: Hurlock	Acidity (soil needs lime), soil blowing, water table.
IgA: Ingleside	Acidity (soil needs lime), soil blowing, water table.
IgB: Ingleside	Acidity (soil needs lime), soil blowing, water table.

Table 6.—Main Cropland Limitations and Hazards—Continued

Map symbol and soil name	Limitations or hazards
IgC: Ingleside	Acidity (soil needs lime), slope, soil blowing, water table.
Kn: Kentuck	Acidity (soil needs lime), ponding, restricted permeability, soil blowing, water table.
Lo: Longmarsh	Acidity (soil needs lime), excessive permeability, flooding, ponding, soil blowing, water table.
LZ:	
Longmarsh	Acidity (soil needs lime), excessive permeability, flooding, ponding, soil blowing, water table.
Zekiah	Acidity (soil needs lime), flooding, water table.
MkA: Matapeake	Acidity (soil needs lime), soil blowing.
MkB: Matapeake	Acidity (soil needs lime), water erosion, soil blowing.
MkC: Matapeake	Acidity (soil needs lime), water erosion, slope, soil blowing.
MtA:	
Mattapex	Acidity (soil needs lime), soil blowing, water table.
Butlertown	Acidity (soil needs lime), restricted permeability, soil blowing, water table.
MtB:	
Mattapex	Acidity (soil needs lime), water erosion, soil blowing, water table.
Butlertown	Acidity (soil needs lime), water erosion, restricted permeability, soil blowing, water table.

Table 6.—Main Cropland Limitations and Hazards—Continued

Map symbol and soil name	Limitations or hazards
MtC: Mattapex	Acidity (soil needs lime), water erosion, slope, soil blowing, water table.
M-W: Miscellaneous water	No data.
NsA: Nassawango	Acidity (soil needs lime), soil blowing, water table.
NsB: Nassawango	Acidity (soil needs lime), water erosion, soil blowing, water table.
Ot: Othello	Acidity (soil needs lime), soil blowing, water table.
PiA: Pineyneck	Acidity (soil needs lime), soil blowing, water table.
PiB: Pineyneck	Acidity (soil needs lime), water erosion, soil blowing, water table.
PiC: Pineyneck	Acidity (soil needs lime), water erosion, slope, soil blowing, water table.
Pk: Puckum	Acidity (soil needs lime), flooding, ponding, water table.
UbB: Udorthents	Nonsoil material.
UdB:	
Udorthents	Acidity (soil needs lime), restricted permeability, soil blowing, water table.
Sulfaquents	No data.
UlB: Udorthents	Nonsoil material.
UoA: Unicorn	Acidity (soil needs lime), soil blowing, water table.
UoB: Unicorn	Acidity (soil needs lime), soil blowing, water table.

Table 6.—Main Cropland Limitations and Hazards—Continued

Map symbol and soil name	Limitations or hazards
Ur: Urban land	Nonsoil material.
UsA:	
Unicorn	Acidity (soil needs lime), soil blowing, water table.
Sassafras	Acidity (soil needs lime), soil blowing.
UsB:	
Unicorn	Acidity (soil needs lime), soil blowing, water table.
Sassafras	Acidity (soil needs lime), soil blowing.
UsC:	
Unicorn	Acidity (soil needs lime), water erosion, slope, soil blowing, water table.
Sassafras	Acidity (soil needs lime), water erosion, slope, soil blowing.
W: Water	No data.
Wh: Whitemarsh	Acidity (soil needs lime), restricted permeability, soil blowing, water table.

Table 7.—Land Capability and Yields per Acre of Crops and Pasture

(Yields in the N columns are for nonirrigated soils; those in the I columns are for irrigated soils. Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Map symbol and soil name	Land capability		Corn		Soybeans		Wheat		Tomatoes		Pasture	
	N	I	N	I	N	I	N	I	N	I	N	I
			Bu	Bu	Bu	Bu	Bu	Bu	Tons	Tons	AUM	AUM
Bp. Bestpitch												
Ca:												
Carmichael (drained)	3w	---	105	---	30	---	40	---	---	---	6	---
Carmichael (undrained)	4w	---	70	---	25	---	---	---	---	---	5	---
Co:												
Corsica (drained)	3w	---	90	---	35	---	35	---	---	---	---	---
Corsica (undrained)	4w	---	---	---	---	---	---	---	---	---	---	---
DhC:												
Downer	3e	---	90	---	30	---	35	---	---	18	---	---
Hammonton	2w	---	95	---	35	---	35	---	---	25	---	---
DoB Downer	2e	---	100	155	45	50	55	---	---	20	---	---
DoE. Downer												
DUD:												
Downer	4e	---	80	---	25	---	30	---	---	---	---	---
Unicorn	4e	---	100	---	---	---	---	---	---	---	---	---
Fg:												
Fallsington (drained)	3w	---	110	---	35	---	45	---	---	---	6	---
Fallsington (undrained)	4w	---	70	---	30	---	35	---	---	---	5	---
FmA Fort Mott	3s	2S	110	150	48	75	---	---	---	20	---	---
FmB Fort Mott	3s	2S	110	150	48	75	---	---	---	20	---	---
GfB:												
Galestown	3s	---	60	150	30	40	25	65	13	20	---	---
Fort Mott	3s	2S	110	150	48	75	---	---	---	20	---	---
GfC:												
Galestown	7s	---	---	---	---	---	---	---	---	---	---	---
Fort Mott	4s	---	80	---	20	---	---	---	---	18	---	---

Table 7.—Land Capability and Yields per Acre of Crops and Pasture—Continued

Map symbol and soil name	Land capability		Corn		Soybeans		Wheat		Tomatoes		Pasture	
	N	I	N	I	N	I	N	I	N	I	N	I
			Bu	Bu	Bu	Bu	Bu	Bu	Tons	Tons	AUM	AUM
GrA---------------- Greenwich	1	---	135	170	45	60	55	70	---	23	---	---
HnA---------------- Hammonton	2w	---	100	---	35	---	35	---	---	25	---	---
HnB---------------- Hammonton	2w	---	100	---	35	---	35	---	---	25	---	---
Ho. Honga												
Hr:												
Hurlock (drained)-	3w	---	110	---	32	---	40	---	---	---	---	---
Hurlock (undrained)------	4w	---	70	---	25	---	25	---	---	---	---	---
IgA---------------- Ingleside	1	---	110	165	45	55	50	55	15	25	---	---
IgB---------------- Ingleside	2e	---	110	165	40	55	50	55	15	25	---	---
IgC---------------- Ingleside	3e	---	90	145	---	---	---	---	---	---	---	---
Kn. Kentuck												
Lo. Longmarsh												
LZ. Longmarsh and Zekiah												
MkA---------------- Matapeake	1	---	140	170	45	60	50	---	---	---	10.5	---
MkB---------------- Matapeake	2e	---	140	170	45	60	50	---	---	---	10.5	---
MkC---------------- Matapeake	3e	---	120	160	30	50	35	---	---	---	9.5	---
MtA:												
Mattapex----------	2w	---	135	165	40	55	65	---	---	---	8.0	---
Butlertown--------	2w	---	130	---	45	---	---	---	---	---	9.5	---
MtB:												
Mattapex----------	2e	---	135	165	40	55	60	---	---	---	8.0	---
Butlertown--------	2e	---	130	---	45	---	---	---	---	---	9.5	---
MtC---------------- Mattapex	3e	---	130	140	35	---	---	---	---	---	7.5	---

Table 7.—Land Capability and Yields per Acre of Crops and Pasture—Continued

Map symbol and soil name	Land capability N	Land capability I	Corn N	Corn I	Soybeans N	Soybeans I	Wheat N	Wheat I	Tomatoes N	Tomatoes I	Pasture N	Pasture I
			Bu	Bu	Bu	Bu	Bu	Bu	Tons	Tons	AUM	AUM
M-W. Miscellaneous water												
NsA---------------- Nassawango	1	---	140	---	45	---	60	---	---	---	---	---
NsB---------------- Nassawango	2e	---	140	---	45	---	60	---	---	---	---	---
Ot:												
Othello (drained)-	3w	---	115	---	40	---	55	---	---	---	6.5	---
Othello (undrained)------	4w	---	---	---	---	---	---	---	---	---	---	---
PiA---------------- Pineyneck	2w	---	135	---	40	---	50	---	---	---	---	---
PiB---------------- Pineyneck	2e	---	135	---	40	---	45	---	---	---	---	---
PiC---------------- Pineyneck	3e	---	130	---	35	---	40	---	---	---	---	---
Pk. Puckum												
UbB. Udorthents												
UdB. Udorthents and Sulfaquents												
UlB. Udorthents												
UoA---------------- Unicorn	1	---	135	170	45	55	50	55	15	25	---	---
UoB---------------- Unicorn	2e	---	135	170	40	55	50	55	15	25	---	---
Ur. Urban land												
UsA:												
Unicorn-----------	1	---	135	170	45	55	50	55	15	25	---	---
Sassafras---------	1	---	130	175	45	---	50	70	---	---	---	---
UsB:												
Unicorn-----------	2e	---	135	170	40	55	50	55	15	25	---	---
Sassafras---------	2e	---	130	170	45	---	50	65	---	---	---	---
UsC:												
Unicorn-----------	3e	---	120	150	30	50	35	---	---	---	---	---
Sassafras---------	3e	---	120	---	40	---	45	---	---	---	---	---

Table 7.—Land Capability and Yields per Acre of Crops and Pasture—Continued

Map symbol and soil name	Land capability		Corn		Soybeans		Wheat		Tomatoes		Pasture	
	N	I	N	I	N	I	N	I	N	I	N	I
			Bu	Bu	Bu	Bu	Bu	Bu	Tons	Tons	AUM	AUM
W. Water												
Wh:												
Whitemarsh (drained)	3w	---	100	---	35	---	40	---	---	---	5.0	---
Whitemarsh (undrained)	4w	---	85	---	30	---	35	---	---	---	---	---

Table 8.—Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland)

Map symbol	Prime farmland code*	Soil name
Ca	2	Carmichael loam
DoB	1	Downer sandy loam, 2 to 5 percent slopes
Fg	2	Fallsington loam
FmA	4	Fort Mott loamy sand, 0 to 2 percent slopes
FmB	4	Fort Mott loamy sand, 2 to 5 percent slopes
GfB	4	Galestown-Fort Mott loamy sands, 0 to 5 percent slopes
GrA	1	Greenwich loam, 0 to 2 percent slopes
HnA	1	Hammonton sandy loam, 0 to 2 percent slopes
HnB	1	Hammonton sandy loam, 2 to 5 percent slopes
Hr	2	Hurlock sandy loam
IgA	1	Ingleside sandy loam, 0 to 2 percent slopes
IgB	1	Ingleside sandy loam, 2 to 5 percent slopes
MkA	1	Matapeake silt loam, 0 to 2 percent slopes
MkB	1	Matapeake silt loam, 2 to 5 percent slopes
MtA	1	Mattapex-Butlertown silt loams, 0 to 2 percent slopes
MtB	1	Mattapex-Butlertown silt loams, 2 to 5 percent slopes
NsA	1	Nassawango silt loam, 0 to 2 percent slopes
NsB	1	Nassawango silt loam, 2 to 5 percent slopes
Ot	2	Othello silt loam
PiA	1	Pineyneck silt loam, 0 to 2 percent slopes
PiB	1	Pineyneck silt loam, 2 to 5 percent slopes
UoA	1	Unicorn silt loam, 0 to 2 percent slopes
UoB	1	Unicorn silt loam, 2 to 5 percent slopes
UsA	1	Unicorn-Sassafras loams, 0 to 2 percent slopes
UsB	1	Unicorn-Sassafras loams, 2 to 5 percent slopes

* Prime farmland codes are as follows:
1 All areas are prime farmland.
2 Only drained areas are prime farmland.
4 Only irrigated areas are prime farmland.

Table 9.—Hydric Soils

Map symbol	Soil name
Bp	Bestpitch peat
Ca	Carmichael loam
Co	Corsica mucky loam
Fg	Fallsington loam
Ho	Honga peat
Hr	Hurlock sandy loam
Kn	Kentucky mucky silt loam
Lo	Longmarsh mucky loam, 0 to 1 percent slopes
LZ	Longmarsh and Zekiah soils, 0 to 2 percent slopes
Ot	Othello silt loam
Pk	Puckum mucky peat
UdB	Udorthents and Sulfaquents, dredge spoil, 0 to 5 percent slopes
Wh	Whitemarsh silt loam

Table 10.—Woodland Management and Productivity

(Absence of an entry indicates that information was not available)

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
Bp. Bestpitch										
Ca: Carmichael	4W	Slight	Moderate	Moderate	Moderate	Severe	Red maple	65	3	Willow oak, loblolly pine, swamp white oak, southern red oak, swamp chestnut oak.
							Sweetgum	80	6	
							White oak	80	4	
							Willow oak	65	4	
Co: Corsica	3W	Slight	Severe	Severe	Severe	Moderate	Red maple	65	3	Swamp chestnut oak, willow oak, loblolly pine, swamp white oak.
							Sweetgum	65	4	
							Swamp chestnut oak	60	4	
							Willow oak	65	4	
DhC:										
Downer	4A	Slight	Slight	Slight	Slight	Slight	Scarlet oak	70	4	Loblolly pine, Virginia pine, white oak, black oak, black walnut.
							Loblolly pine	65	6	
							Virginia pine	60	6	
							White oak	70	4	
							Black oak	70	4	
Hammonton	4A	Slight	Slight	Slight	Slight	Slight	Shortleaf pine	70	8	Loblolly pine, Virginia pine, white oak, black oak, black walnut, yellow-poplar, northern red oak.
							Pitch pine	80	8	
							Loblolly pine	60	5	
							Virginia pine	70	8	
							White oak	80	4	
							Black oak	80	4	
DoB: Downer	4A	Slight	Slight	Slight	Slight	Slight	Scarlet oak	70	4	Loblolly pine, Virginia pine, white oak, black oak, black walnut, yellow-poplar, northern red oak.
							Loblolly pine	65	6	
							Virginia pine	60	6	
							White oak	70	4	
							Black oak	70	4	
DOE: Downer	4R	Moderate	Moderate	Slight	Slight	Slight	White oak	70	4	Loblolly pine, Virginia pine, black oak, black walnut, yellow-poplar, white oak, northern red oak.
							Scarlet oak	70	4	
							Loblolly pine	65	6	
							Virginia pine	60	6	
							Black oak	70	4	
DuD:										
Downer	4A	Slight	Slight	Slight	Slight	Slight	Scarlet oak	70	4	Loblolly pine, Virginia pine, white oak, black oak, black walnut, yellow-poplar, northern red oak.
							Loblolly pine	65	6	
							Virginia pine	60	6	
							White oak	70	4	
							Black oak	70	4	

See footnote at end of table.

Table 10.—Woodland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
DuD:										
Unicorn-------	8A	Slight	Slight	Slight	Slight	Slight	Virginia pine-----	75	8	Loblolly pine, white oak, black oak, flowering dogwood, black walnut, yellow-poplar, Norway spruce, white spruce, northern red oak.
							Scarlet oak-------	75	4	
							Loblolly pine-----	80	8	
							White oak---------	75	4	
							Black oak---------	70	4	
Fg------------- Fallsington	9W	Slight	Moderate	Moderate	Moderate	Severe	White oak---------	---	---	Sweetgum, loblolly pine, yellow-poplar, eastern white pine.
							Willow oak--------	---	---	
							Sweetgum----------	80	6	
							Loblolly pine-----	90	9	
FmA------------ Fort Mott	8A	Slight	Moderate	Slight	Slight	Slight	Shortleaf pine----	70	8	Virginia pine, loblolly pine.
							Pitch pine--------	---	---	
							White oak---------	70	4	
							Black oak---------	70	4	
							Virginia pine-----	70	8	
FmB------------ Fort Mott	8A	Slight	Moderate	Slight	Slight	Slight	Shortleaf pine----	70	8	Virginia pine, loblolly pine.
							Pitch pine--------	---	---	
							White oak---------	70	4	
							Black oak---------	70	4	
							Virginia pine-----	70	8	
GfB:										
Galestown-----	4S	Slight	Moderate	Moderate	Slight	Moderate	Black oak---------	70	4	Shortleaf pine, loblolly pine, Virginia pine.
							Shortleaf pine----	70	8	
							Loblolly pine-----	80	8	
							Virginia pine-----	70	8	
Fort Mott-----	8A	Slight	Moderate	Slight	Slight	Slight	Shortleaf pine----	70	8	Virginia pine, loblolly pine.
							Pitch pine--------	---	---	
							White oak---------	70	4	
							Black oak---------	70	4	
							Virginia pine-----	70	8	
GfC:										
Galestown-----	4S	Slight	Moderate	Moderate	Slight	Moderate	Black oak---------	70	4	Shortleaf pine, loblolly pine, Virginia pine.
							Shortleaf pine----	70	8	
							Loblolly pine-----	80	8	
							Virginia pine-----	70	8	
Fort Mott-----	8A	Slight	Moderate	Slight	Slight	Slight	Shortleaf pine----	70	8	Virginia pine, loblolly pine.
							Pitch pine--------	---	---	
							White oak---------	70	4	
							Black oak---------	70	4	
							Virginia pine-----	70	8	

See footnote at end of table.

Table 10.—Woodland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
GrA------------ Greenwich	4	Slight	Slight	Slight	Slight	Slight	Virginia pine-----	80	8	Yellow-poplar, loblolly pine, white oak, black oak, black walnut, Norway spruce, eastern white pine.
							Yellow-poplar-----	85	6	
							Loblolly pine-----	90	8	
							White oak---------	75	5	
							Black oak---------	75	5	
HnA------------ Hammonton	4A	Slight	Slight	Slight	Slight	Slight	Shortleaf pine----	70	8	Loblolly pine, Virginia pine, white oak, black oak, black walnut, yellow-poplar, northern red oak.
							Pitch pine--------	80	8	
							Loblolly pine-----	60	5	
							Virginia pine-----	70	8	
							White oak---------	80	4	
							Black oak---------	80	4	
HnB------------ Hammonton	4A	Slight	Slight	Slight	Slight	Slight	Shortleaf pine----	70	8	Loblolly pine, Virginia pine, white oak, black oak, black walnut, yellow-poplar, northern red oak.
							Pitch pine--------	80	8	
							Loblolly pine-----	60	5	
							Virginia pine-----	70	8	
							White oak---------	80	4	
							Black oak---------	80	4	
Ho. Honga										
Hr------------- Hurlock	8W	Slight	Severe	Moderate	Moderate	Severe	Red maple---------	70	3	Loblolly pine, willow oak, yellow-poplar, swamp white oak, southern red oak, swamp chestnut oak.
							White oak---------	70	4	
							Loblolly pine-----	85	8	
							Willow oak--------	70	4	
IgA------------ Ingleside	8A	Slight	Slight	Slight	Slight	Slight	Virginia pine-----	70	8	White oak, black oak, flowering dogwood, yellow-poplar, loblolly pine, northern red oak.
							Scarlet oak-------	70	4	
							White oak---------	70	4	
							Black oak---------	65	3	
IgB------------ Ingleside	8A	Slight	Slight	Slight	Slight	Slight	Virginia pine-----	70	8	White oak, black oak, flowering dogwood, yellow-poplar, loblolly pine, northern red oak.
							Scarlet oak-------	70	4	
							White oak---------	70	4	
							Black oak---------	65	3	
IgC------------ Ingleside	8A	Slight	Slight	Slight	Slight	Slight	Virginia pine-----	70	8	White oak, black oak, flowering dogwood, yellow-poplar, loblolly pine, northern red oak.
							Scarlet oak-------	70	4	
							White oak---------	70	4	
							Black oak---------	65	3	

See footnote at end of table.

Table 10.—Woodland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
Kn------------- Kentuck	3W	Slight	Severe	Severe	Severe	Severe	Red maple--------- Sweetgum---------- Water oak--------- Loblolly pine----- Swamp chestnut oak Willow oak--------	70 70 70 70 60 70	3 4 4 6 4 4	Loblolly pine, swamp chestnut, oak, willow oak, swamp white oak, southern red oak.
Lo------------- Longmarsh	3W	Slight	Severe	Severe	Severe	Severe	Red maple--------- Blackgum---------- Water oak---------	60 60 70	3 6 4	Atlantic white-cedar, green ash, baldcypress.
LZ:										
Longmarsh-----	3W	Slight	Severe	Severe	Severe	Severe	Red maple--------- Blackgum---------- Water oak---------	60 60 70	3 6 4	Atlantic white-cedar, green ash, baldcypress.
Zekiah--------	3W	Slight	Severe	Severe	Moderate	Severe	Red maple--------- Sweetgum---------- Water oak---------	60 80 70	3 6 4	Eastern white pine, American sycamore.
MkA------------ Matapeake	4A	Slight	Slight	Slight	Slight	Severe	Virginia pine----- White oak--------- Yellow-poplar----- Loblolly pine-----	75 75 90 80	8 4 6 8	Yellow-poplar, loblolly pine, sweetgum, eastern white pine.
MkB------------ Matapeake	4A	Slight	Slight	Slight	Slight	Severe	Virginia pine----- White oak--------- Yellow-poplar----- Loblolly pine-----	75 75 90 80	8 4 6 8	Yellow-poplar, loblolly pine, sweetgum, eastern white pine.
MkC------------ Matapeake	4A	Slight	Slight	Slight	Slight	Severe	Virginia pine----- White oak--------- Yellow-poplar----- Loblolly pine-----	75 75 90 80	8 4 6 8	Yellow-poplar, loblolly pine, sweetgum, eastern white pine.
MtA:										
Mattapex------	4A	Slight	Slight	Slight	Slight	Moderate	Sweetgum---------- Virginia pine----- White oak--------- Northern red oak-- Loblolly pine-----	80 70 70 70 81	6 8 4 4 8	Loblolly pine, yellow-poplar, eastern white pine.
Butlertown----	4A	Slight	Slight	Slight	Slight	Moderate	Sweetgum---------- White oak--------- Northern red oak-- Yellow-poplar----- Loblolly pine-----	90 80 80 90 90	7 4 4 6 9	Yellow-poplar, loblolly pine.
MtB:										
Mattapex------	4A	Slight	Slight	Slight	Slight	Moderate	Sweetgum---------- Virginia pine----- White oak--------- Northern red oak-- Loblolly pine-----	80 70 70 70 81	6 8 4 4 8	Loblolly pine, yellow-poplar, eastern white pine.

See footnote at end of table.

Table 10.—Woodland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
MtB: Butlertown	4A	Slight	Slight	Slight	Slight	Moderate	Sweetgum	90	7	Yellow-poplar, loblolly pine.
							White oak	80	4	
							Northern red oak	80	4	
							Yellow-poplar	90	6	
							Loblolly pine	90	9	
MtC: Mattapex	4A	Slight	Slight	Slight	Slight	Moderate	Sweetgum	80	6	Loblolly pine, yellow-poplar, eastern white pine.
							Virginia pine	70	8	
							White oak	70	4	
							Northern red oak	70	4	
							Loblolly pine	81	8	
M-W. Miscellaneous water										
NsA: Nassawango	8A	Slight	Slight	Slight	Slight	Slight	Yellow-poplar	90	6	Yellow-poplar, loblolly pine, white oak, eastern white pine, black oak.
							Loblolly pine	85	8	
							White oak	75	4	
NsB: Nassawango	8A	Slight	Slight	Slight	Slight	Slight	Yellow-poplar	90	6	Yellow-poplar, loblolly pine, white oak, eastern white pine, black oak.
							Loblolly pine	85	8	
							White oak	75	4	
Ot: Othello	4W	Slight	Severe	Severe	Slight	Severe	Red maple	50	2	Loblolly pine, swamp white oak, southern red oak, swamp chestnut oak, willow oak.
							Sweetgum	80	6	
							White oak	80	4	
							Loblolly pine	83	8	
PiA: Pineyneck	4A	Slight	Slight	Slight	Slight	Moderate	Sweetgum	90	7	Yellow-poplar, loblolly pine, white oak, northern red oak, flowering dogwood, Norway spruce, white spruce, eastern white pine, black oak.
							Yellow-poplar	90	6	
							Loblolly pine	80	8	
							White oak	81	4	
							Northern red oak	80	4	
PiB: Pineyneck	4A	Slight	Slight	Slight	Slight	Moderate	Sweetgum	90	7	Yellow-poplar, loblolly pine, white oak, northern red oak, flowering dogwood, Norway spruce, white spruce, eastern white pine, black oak.
							Yellow-poplar	90	6	
							Loblolly pine	80	8	
							White oak	81	4	
							Northern red oak	80	4	

See footnote at end of table.

Table 10.—Woodland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
PiC------------ Pineyneck	4A	Slight	Slight	Slight	Slight	Moderate	Sweetgum----------	90	7	Yellow-poplar, loblolly pine, white oak, northern red oak, flowering dogwood, Norway spruce, white spruce, eastern white pine, black oak.
							Yellow-poplar-----	90	6	
							Loblolly pine-----	80	8	
							White oak---------	81	4	
							Northern red oak--	80	4	
Pk------------- Puckum	2W	Slight	Severe	Severe	Severe	Severe	Red maple---------	50	2	Atlantic white-cedar, baldcypress.
							Sweetgum----------	60	4	
							Blackgum----------	60	6	
							Swamp chestnut oak	60	---	
							Water oak---------	60	3	
							Northern whitecedar-------	60	6	
UbB. Udorthents										
UdB. Udorthents and Sulfaquents										
UlB. Udorthents										
UoA------------ Unicorn	8A	Slight	Slight	Slight	Slight	Slight	Virginia pine-----	75	8	Loblolly pine, white oak, black oak, flowering dogwood, black walnut, yellow-poplar, Norway spruce, white spruce, northern red oak.
							Scarlet oak-------	75	4	
							Loblolly pine-----	80	8	
							White oak---------	75	4	
							Black oak---------	70	4	
UoB------------ Unicorn	8A	Slight	Slight	Slight	Slight	Slight	Virginia pine-----	75	8	Loblolly pine, white oak, black oak, flowering dogwood, black walnut, yellow-poplar, Norway spruce, white spruce, northern red oak.
							Scarlet oak-------	75	4	
							Loblolly pine-----	80	8	
							White oak---------	75	4	
							Black oak---------	70	4	
Ur. Urban land										

See footnote at end of table.

Table 10.—Woodland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
UsA:										
Unicorn-------	8A	Slight	Slight	Slight	Slight	Slight	Virginia pine-----	75	8	Loblolly pine,
							Scarlet oak-------	75	4	white oak, black
							Loblolly pine-----	80	8	oak, flowering
							White oak---------	75	4	dogwood,
							Black oak---------	70	4	black walnut,
										yellow-poplar,
										Norway spruce,
										white spruce,
										northern red oak.
Sassafras-----	4A	Slight	Slight	Slight	Slight	Slight	Virginia pine-----	70	8	Yellow-poplar,
							White oak---------	70	4	loblolly pine,
							Yellow-poplar-----	80	5	eastern white
							Loblolly pine-----	85	8	pine.
UsB:										
Unicorn-------	8A	Slight	Slight	Slight	Slight	Slight	Virginia pine-----	75	8	Loblolly pine,
							Scarlet oak-------	75	4	white oak, black
							Loblolly pine-----	80	8	oak, flowering
							White oak---------	75	4	dogwood,
							Black oak---------	70	4	black walnut,
										yellow-poplar,
										Norway spruce,
										white spruce,
										northern red oak.
Sassafras-----	4A	Slight	Slight	Slight	Slight	Slight	Virginia pine-----	70	8	Yellow-poplar,
							White oak---------	70	4	loblolly pine,
							Yellow-poplar-----	80	5	eastern white
							Loblolly pine-----	85	8	pine.
UsC:										
Unicorn-------	8A	Slight	Slight	Slight	Slight	Slight	Virginia pine-----	75	8	Loblolly pine,
							Scarlet oak-------	75	4	white oak, black
							Loblolly pine-----	80	8	oak, flowering
							White oak---------	75	4	dogwood,
							Black oak---------	70	4	black walnut,
										yellow-poplar,
										Norway spruce,
										white spruce,
										northern red oak.
Sassafras-----	4A	Slight	Slight	Slight	Slight	Slight	Virginia pine-----	70	8	Yellow-poplar,
							White oak---------	70	4	loblolly pine,
							Yellow-poplar-----	80	5	eastern white
							Loblolly pine-----	85	8	pine.
W. Water										
Wh------------- Whitemarsh	8W	Slight	Severe	Severe	Moderate	Severe	Red maple---------	60	3	Loblolly pine,
							Sweetgum----------	80	6	swamp white oak,
							Eastern white pine	65	8	southern red oak,
							Loblolly pine-----	80	8	swamp chestnut
										oak, willow oak.

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

Table 11.—Recreational Development

(Absence of an entry indicates that the soil was not rated or that information was not available)

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
Bp: Bestpitch	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus, excess salt.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.
Ca: Carmichael	Severe: wetness, too acid.	Severe: wetness, too acid.	Severe: wetness, too acid.	Severe: wetness.
Co: Corsica	Severe: ponding, too acid.	Severe: ponding, too acid.	Severe: ponding, too acid.	Severe: ponding.
DhC:				
Downer	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Hammonton	Moderate: wetness, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: wetness.
DoB: Downer	Slight	Slight	Moderate: slope, small stones.	Slight.
DOE: Downer	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
DuD:				
Downer	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Unicorn	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Fg: Fallsington	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
FmA: Fort Mott	Moderate: too sandy.	Moderate: too sandy.	Moderate: small stones, too sandy.	Moderate: too sandy.
FmB: Fort Mott	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, small stones, too sandy.	Moderate: too sandy.
GfB:				
Galestown	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, small stones, too sandy.	Moderate: too sandy.
Fort Mott	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, small stones, too sandy.	Moderate: too sandy.

Table 11.—Recreational Development—Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
GfC:				
Galestown	Moderate: too sandy.	Moderate: too sandy.	Severe: slope.	Moderate: too sandy.
Fort Mott	Moderate: too sandy.	Moderate: too sandy.	Severe: slope.	Moderate: too sandy.
GrA Greenwich	Slight	Slight	Moderate: small stones.	Slight.
HnA Hammonton	Moderate: wetness.	Moderate: wetness.	Moderate: small stones, wetness.	Moderate: wetness.
HnB Hammonton	Moderate: wetness.	Moderate: wetness.	Moderate: slope, small stones, wetness.	Moderate: wetness.
Ho Honga	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus, excess salt.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.
Hr Hurlock	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
IgA Ingleside	Slight	Slight	Moderate: small stones.	Slight.
IgB Ingleside	Slight	Slight	Moderate: slope, small stones.	Slight.
IgC Ingleside	Slight	Slight	Severe: slope.	Slight.
Kn Kentuck	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Lo Longmarsh	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.
LZ:				
Longmarsh	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.
Zekiah	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.
MkA Matapeake	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight.
MkB Matapeake	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
MkC Matapeake	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight.

Table 11.—Recreational Development—Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
MtA:				
Mattapex	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness.
Butlertown	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight.
MtB:				
Mattapex	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.
Butlertown	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight.
MtC Mattapex	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: slope.	Moderate: wetness.
M-W. Miscellaneous water				
NsA Nassawango	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight.
NsB Nassawango	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
Ot Othello	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
PiA Pineyneck	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
PiB Pineyneck	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Moderate: wetness.
PiC Pineyneck	Moderate: slope, wetness.	Moderate: wetness, slope.	Severe: slope.	Moderate: wetness.
Pk Puckum	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus, too acid.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.
UbB Udorthents	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight.
UdB:				
Udorthents	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight.

Table 11.—Recreational Development—Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
UdB: Sulfaquents.				
UlB------------------- Udorthents	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight.
UoA------------------- Unicorn	Slight----------	Slight-----------	Slight----------	Slight.
UoB------------------- Unicorn	Slight----------	Slight-----------	Moderate: slope.	Slight.
Ur. Urban land				
UsA: Unicorn--------------	Slight----------	Slight-----------	Slight----------	Slight.
Sassafras------------	Slight----------	Slight-----------	Slight----------	Slight.
UsB: Unicorn--------------	Slight----------	Slight-----------	Moderate: slope.	Slight.
Sassafras------------	Slight----------	Slight-----------	Moderate: slope.	Slight.
UsC: Unicorn--------------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Sassafras------------	Slight----------	Slight-----------	Severe: slope.	Slight.
W. Water				
Wh-------------------- Whitemarsh	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.

Table 12.—Wildlife Habitat

(Absence of an entry indicates that the soil was not rated or that information was not available)

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Bp: Bestpitch	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Ca:										
Carmichael (drained)	Fair	Fair	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Carmichael (undrained)	Poor	Poor	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Co:										
Corsica (drained)	Fair	Fair	Good	Good	Good	Good	Good	Fair	Good	Good.
Corsica (undrained)	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
DhC:										
Downer	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Hammonton	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Very poor.
DoB: Downer	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
DOE: Downer	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
DUD:										
Downer	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Unicorn	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Fg:										
Fallsington (drained)	Fair	Good	Good	Good	Good	Good	Fair	Good	Good	Fair.
Fallsington (undrained)	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
FmA: Fort Mott	Poor	Fair	Fair	Poor	Poor	Poor	Very poor.	Fair	Poor	Very poor.
FmB: Fort Mott	Poor	Fair	Fair	Poor	Poor	Poor	Very poor.	Fair	Poor	Very poor.
GfB:										
Galestown	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
Fort Mott	Poor	Fair	Fair	Poor	Poor	Poor	Very poor.	Fair	Poor	Very poor.

Table 12.—Wildlife Habitat—Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
GfC:										
Galestown----------	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
Fort Mott----------	Poor	Fair	Fair	Poor	Poor	Poor	Very poor.	Fair	Poor	Very poor.
GrA----------------- Greenwich	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HnA----------------- Hammonton	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Very poor.
HnB----------------- Hammonton	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Very poor.
Ho------------------ Honga	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Hr:										
Hurlock (drained)--	Fair	Good	Good	Good	Good	Good	Fair	Good	Good	Fair.
Hurlock (undrained)	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
IgA----------------- Ingleside	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
IgB----------------- Ingleside	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
IgC----------------- Ingleside	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Kn------------------ Kentuck	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Fair	Good.
Lo------------------ Longmarsh	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Fair	Good.
LZ:										
Longmarsh----------	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Fair	Good.
Zekiah-------------	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Fair	Good.
MkA----------------- Matapeake	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MkB----------------- Matapeake	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MkC----------------- Matapeake	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MtA:										
Mattapex-----------	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Butlertown---------	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.

Table 12.—Wildlife Habitat—Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
MtB:										
Mattapex	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Butlertown	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MtC Mattapex	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
M-W. Miscellaneous water										
NsA Nassawango	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
NsB Nassawango	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Ot Othello (drained or undrained)	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
PiA Pineyneck	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
PiB Pineyneck	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
PiC Pineyneck	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Pk Puckum	Very poor.	Very poor.	Poor	Poor	Poor	Good	Good	Very poor.	Poor	Good.
UbB. Udorthents										
UdB. Udorthents and Sulfaquents										
UlB. Udorthents										
UoA Unicorn	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
UoB Unicorn	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ur. Urban land										
UsA:										
Unicorn	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Sassafras	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

Table 12.—Wildlife Habitat—Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
UsB:										
Unicorn------------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Sassafras----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
UsC:										
Unicorn------------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Sassafras----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
W. Water										
Wh------------------ Whitemarsh (drained or undrained)	Poor	Poor	Poor	Fair	Fair	Good	Good	Poor	Fair	Good.

Table 13.--Building Site Development

(Absence of an entry indicates that the soil was not rated or that information was not available)

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and and streets	Lawns landscaping, and golf fairways
Bp: Bestpitch	Severe: excess humus, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, ponding, flooding.	Severe: excess salt, excess sulfur, ponding.
Ca: Carmichael	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
Co: Corsica	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
DhC:						
Downer	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
Hammonton	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: frost action.	Moderate: wetness, droughty.
DoB: Downer	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
DOE: Downer	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
DUD:						
Downer	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty.
Unicorn	Severe: cutbanks cave.	Moderate: slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: slope, frost action.	Slight.
Fg: Fallsington	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
FmA: Fort Mott	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Moderate: droughty.
FmB: Fort Mott	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Moderate: droughty.
GfB:						
Galestown	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
Fort Mott	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Moderate: droughty.
GfC:						
Galestown	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Severe: droughty.
Fort Mott	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Moderate: droughty.

Table 13.—Building Site Development—Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns landscaping, and golf fairways
GrA: Greenwich	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Slight.
HnA: Hammonton	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: frost action.	Moderate: wetness, droughty.
HnB: Hammonton	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: frost action.	Moderate: wetness, droughty.
Ho: Honga	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: excess salt, excess sulfur, ponding.
Hr: Hurlock	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
IgA: Ingleside	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
IgB: Ingleside	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
IgC: Ingleside	Severe: cutbanks cave.	Slight	Moderate: wetness.	Moderate: slope.	Slight	Moderate: droughty.
Kn: Kentuck	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding.	Severe: ponding.
Lo: Longmarsh	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding, frost action.	Severe: ponding, flooding.
LZ:						
Longmarsh	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding, frost action.	Severe: ponding, flooding.
Zekiah	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
MkA: Matapeake	Slight	Slight	Slight	Slight	Severe: low strength.	Slight.
MkB: Matapeake	Slight	Slight	Slight	Slight	Severe: low strength.	Slight.
MkC: Matapeake	Slight	Slight	Slight	Moderate: slope.	Severe: low strength.	Slight.
MtA:						
Mattapex	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: low strength.	Moderate: wetness.

Table 13.—Building Site Development—Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and and streets	Lawns landscaping, and golf fairways
MtA:						
Butlertown-------	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: low strength, frost action.	Slight.
MtB:						
Mattapex---------	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: low strength.	Moderate: wetness.
Butlertown-------	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: low strength, frost action.	Slight.
MtC--------------- Mattapex	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: low strength.	Moderate: wetness.
M-W. Miscellaneous water						
NsA--------------- Nassawango	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Severe: low strength.	Slight.
NsB--------------- Nassawango	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Severe: low strength.	Slight.
Ot---------------- Othello	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
PiA--------------- Pineyneck	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, frost action.	Moderate: wetness.
PiB--------------- Pineyneck	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, frost action.	Moderate: wetness.
PiC--------------- Pineyneck	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Moderate: wetness.
Pk---------------- Puckum	Severe: excess humus, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, ponding, flooding.	Severe: ponding, flooding.
UbB--------------- Udorthents	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, frost action.	Slight.
UdB:						
Udorthents-------	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, frost action.	Slight.
Sulfaquents.						
UlB. Udorthents						

Table 13.—Building Site Development—Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and and streets	Lawns landscaping, and golf fairways
UoA--------------- Unicorn	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Moderate: frost action.	Slight.
UoB--------------- Unicorn	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Moderate: frost action.	Slight.
Ur. Urban land						
UsA:						
Unicorn----------	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Moderate: frost action.	Slight.
Sassafras--------	Severe: cutbanks cave.	Slight---------	Slight--------	Slight---------	Moderate: frost action.	Slight.
UsB:						
Unicorn----------	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Moderate: frost action.	Slight.
Sassafras--------	Severe: cutbanks cave.	Slight---------	Slight--------	Slight---------	Moderate: frost action.	Slight.
UsC:						
Unicorn----------	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Moderate: slope.	Moderate: frost action.	Slight.
Sassafras--------	Severe: cutbanks cave.	Slight---------	Slight--------	Moderate: slope.	Moderate: frost action.	Slight.
W. Water						
Wh---------------- Whitemarsh	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.	Severe: wetness.

Table 14.—Sanitary Facilities

(Absence of an entry indicates that the soil was not rated or that information was not available)

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Bp-------------------- Bestpitch	Severe: subsides, flooding, ponding.	Severe: seepage, flooding, excess humus.	Severe: flooding, ponding, too clayey.	Severe: flooding, seepage, ponding.	Poor: too clayey, hard to pack, ponding.
Ca-------------------- Carmichael	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Co-------------------- Corsica	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: seepage, ponding. too acid.	Severe: seepage, ponding.	Poor: ponding, too acid.
DhC:					
Downer---------------	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy, too acid.	Severe: seepage.	Poor: seepage, too sandy.
Hammonton------------	Severe: wetness, poor filter.	Severe: seepage, slope, wetness.	Severe: seepage, wetness. too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, small stones.
DoB------------------- Downer	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy, too acid.	Severe: seepage.	Poor: seepage, too sandy.
DOE------------------- Downer	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too acid.	Severe: seepage, slope.	Poor: seepage, small stones, slope.
DUD:					
Downer---------------	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too acid.	Severe: seepage.	Poor: seepage, small stones.
Unicorn--------------	Moderate: wetness, percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, wetness, too acid.	Severe: seepage.	Poor: too sandy.
Fg-------------------- Fallsington	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
FmA------------------- Fort Mott	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: thin layer.
FmB------------------- Fort Mott	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: thin layer.

Table 14.—Sanitary Facilities—Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
GfB:					
Galestown	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Fort Mott	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage.
GfC:					
Galestown	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Fort Mott	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: thin layer.
GrA Greenwich	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: thin layer.
HnA Hammonton	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, small stones.
HnB Hammonton	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, small stones.
Ho Honga	Severe: flooding, ponding, percs slowly.	Severe: seepage, flooding, excess humus.	Severe: flooding, ponding, excess salt.	Severe: flooding, ponding.	Poor: ponding, excess salt.
Hr Hurlock	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
IgA Ingleside	Severe: wetness, poor filter.	Severe: seepage.	Severe: wetness.	Severe: seepage.	Poor: seepage, too sandy.
IgB Ingleside	Severe: wetness, poor filter.	Severe: seepage.	Severe: wetness.	Severe: seepage.	Poor: thin layer.
IgC Ingleside	Severe: wetness, poor filter.	Severe: seepage, slope.	Severe: wetness.	Severe: seepage.	Poor: thin layer.
Kn Kentuck	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
Lo Longmarsh	Severe: flooding, ponding, poor filter.	Severe: seepage, flooding, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: seepage, too sandy, small stones.

Table 14.—Sanitary Facilities—Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
LZ:					
Longmarsh	Severe: flooding, ponding, poor filter.	Severe: seepage, flooding, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: seepage, too sandy, small stones.
Zekiah	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness, too acid.
MkA: Matapeake	Severe: percs slowly.	Moderate: seepage.	Severe: seepage.	Slight	Fair: too clayey.
MkB: Matapeake	Severe: percs slowly.	Moderate: seepage, slope.	Severe: seepage.	Slight	Fair: too clayey.
MkC: Matapeake	Severe: percs slowly.	Severe: slope.	Severe: seepage.	Slight	Fair: too clayey.
MtA:					
Mattapex	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: too clayey, wetness.
Butlertown	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Fair: wetness.
MtB:					
Mattapex	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: too clayey, wetness.
Butlertown	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Fair: wetness.
MtC: Mattapex	Severe: wetness, percs slowly.	Severe: seepage, slope, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: too clayey, wetness.
M-W. Miscellaneous water					
NsA: Nassawango	Severe: wetness, percs slowly.	Moderate: seepage, wetness.	Slight	Slight	Poor: too acid.
NsB: Nassawango	Severe: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Slight	Slight	Poor: too acid.
Ot: Othello	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness, thin layer.

Table 14.—Sanitary Facilities—Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
PiA------------------- Pineyneck	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, too acid.
PiB------------------- Pineyneck	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, too acid.
PiC------------------- Pineyneck	Severe: wetness, poor filter.	Severe: seepage, slope, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, too acid.
Pk-------------------- Puckum	Severe: flooding, ponding.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: ponding, excess humus, too acid.
UbB------------------- Udorthents	Severe: percs slowly.	Moderate: slope.	Severe: wetness.	Slight------------	Good.
UdB:					
Udorthents-----------	Severe: percs slowly.	Moderate: slope.	Severe: wetness.	Slight------------	Good.
Sulfaquents.					
UlB. Udorthents					
UoA------------------- Unicorn	Severe: wetness.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: too sandy.
UoB------------------- Unicorn	Severe: wetness.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: too sandy.
Ur. Urban land					
UsA:					
Unicorn--------------	Severe: wetness.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: too sandy.
Sassafras------------	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight------------	Fair: thin layer.
UsB:					
Unicorn--------------	Severe: wetness.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: too sandy.
Sassafras------------	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight------------	Fair: thin layer.

Table 14.—Sanitary Facilities—Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
UsC:					
Unicorn	Severe: wetness.	Severe: seepage, slope.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: too sandy.
Sassafras	Moderate: percs slowly.	Severe: seepage, slope.	Severe: seepage.	Slight	Fair: thin layer.
W. Water					
Wh Whitemarsh	Severe: wetness, percs slowly.	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.

Table 15.—Construction Materials

(Absence of an entry indicates that the soil was not rated or that information was not available)

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
Bp: Bestpitch	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, excess salt, wetness.
Ca: Carmichael	Poor: wetness.	Probable	Improbable: too sandy.	Poor: area reclaim, wetness.
Co: Corsica	Poor: wetness.	Probable	Probable	Poor: area reclaim, wetness.
DhC:				
Downer	Good	Probable	Probable	Fair: small stones.
Hammonton	Fair: wetness.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
DoB: Downer	Good	Probable	Probable	Fair: small stones.
DOE: Downer	Fair: slope.	Probable	Probable	Poor: slope.
DUD:				
Downer	Good	Probable	Probable	Fair: slope, small stones.
Unicorn	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Fg: Fallsington	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.
FmA: Fort Mott	Good	Probable	Improbable: too sandy.	Fair: too sandy, small stones.
FmB: Fort Mott	Good	Probable	Improbable: too sandy.	Fair: too sandy, small stones.
GfB:				
Galestown	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Fort Mott	Good	Probable	Improbable: too sandy.	Fair: too sandy, small stones.
GfC:				
Galestown	Good	Probable	Improbable: too sandy.	Poor: too sandy.

Table 15.—Construction Materials—Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
GfC:				
Fort Mott	Good	Probable	Improbable: too sandy.	Fair: too sandy, small stones.
GrA Greenwich	Good	Probable	Improbable: too sandy.	Fair: small stones, area reclaim.
HnA Hammonton	Fair: wetness.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
HnB Hammonton	Fair: wetness.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Ho Honga	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt, wetness.
Hr Hurlock	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.
IgA Ingleside	Good	Probable	Probable	Fair: small stones.
IgB Ingleside	Good	Probable	Probable	Fair: small stones, area reclaim.
IgC Ingleslide	Good	Probable	Probable	Fair: small stones, area reclaim.
Kn Kentuck	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Lo Longmarsh	Poor: wetness.	Probable	Improbable: too sandy.	Poor: small stones, area reclaim, wetness.
LZ:				
Longmarsh	Poor: wetness.	Probable	Improbable: too sandy.	Poor: small stones, area reclaim, wetness.
Zekiah	Poor: wetness.	Probable	Probable	Poor: wetness.
MkA Matapeake	Good	Probable	Improbable: too sandy.	Good.
MkB Matapeake	Good	Probable	Improbable: too sandy.	Good.

Table 15.—Construction Materials—Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
MkC: Matapeake	Good	Probable	Improbable: too sandy.	Good.
MtA:				
Mattapex	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Butlertown	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
MtB:				
Mattapex	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Butlertown	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
MtC: Mattapex	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
M-W. Miscellaneous water				
NsA: Nassawango	Good	Probable	Improbable: excess fines.	Good.
NsB: Nassawango	Good	Probable	Improbable: excess fines.	Good.
Ot: Othello	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.
PiA: Pineyneck	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
PiB: Pineyneck	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
PiC: Pineyneck	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Pk: Puckum	Poor: wetness, low strength.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness, too acid.
UbB: Udorthents	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
UdB:				
Udorthents	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Sulfaquents.				
UlB. Udorthents				
UoA: Unicorn	Good	Improbable: excess fines.	Improbable: excess fines.	Good.

Table 15.—Construction Materials—Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
UoB------------------- Unicorn	Good-------------	Improbable: excess fines.	Improbable: excess fines.	Good.
Ur. Urban land				
UsA:				
Unicorn--------------	Good-------------	Improbable: excess fines.	Improbable: excess fines.	Good.
Sassafras------------	Good-------------	Probable----------	Probable----------	Good.
UsB:				
Unicorn--------------	Good-------------	Improbable: excess fines.	Improbable: excess fines.	Good.
Sassafras------------	Good-------------	Probable----------	Probable----------	Good.
UsC:				
Unicorn--------------	Good-------------	Improbable: excess fines.	Improbable: excess fines.	Good.
Sassafras------------	Good-------------	Probable----------	Probable----------	Good.
W. Water				
Wh------------------- Whitemarsh	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

Table 16.—Water Management

(Absence of an entry indicates that the soil was not rated or that information was not availabl

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions
Bp: Bestpitch	Severe: seepage.	Severe: ponding, excess salt.	Severe: slow refill, salty water.	Ponding, percs slowly, flooding.	Ponding, percs slowly, flooding.	Ponding, percs slowly
Ca: Carmichael	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, frost action, cutbanks cave.	Wetness, percs slowly, rooting depth.	Erodes easily wetness, too sandy.
Co: Corsica	Severe: seepage.	Severe: piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding, too acid.	Ponding, too acid.	Ponding
DhC:						
Downer	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, soil blowing.	Too sandy, soil blowing
Hammonton	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Frost action, slope, cutbanks cave.	Slope, wetness, droughty.	Wetness, too sandy, soil blowing
DoB: Downer	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, soil blowing.	Too sandy, soil blowing
DOE: Downer	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Slope, too sandy, soil blowing
DuD:						
Downer	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, soil blowing.	Slope, too sandy, soil blowing
Unicorn	Severe: seepage, slope.	Severe: piping.	Severe: cutbanks cave.	Deep to water	Slope	Slope
Fg: Fallsington	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Cutbanks cave	Wetness, rooting depth.	Wetness, too sandy.

Table 16.—Water Management—Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions
FmA: Fort Mott	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Soil blowing
FmB: Fort Mott	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Soil blowing
GfB:						
Galestown	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing
Fort Mott	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Soil blowing
GfC:						
Galestown	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Too sandy, soil blowing
Fort Mott	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Soil blowing
GrA: Greenwich	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Favorable	Favorable
HnA: Hammonton	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness, droughty, soil blowing.	Wetness, too sandy, soil blowing
HnB: Hammonton	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Frost action, slope, cutbanks cave.	Slope, wetness, droughty.	Wetness, too sandy, soil blowing
Ho: Honga	Slight	Severe: ponding, excess salt.	Severe: slow refill, salty water.	Ponding, percs slowly, flooding.	Ponding, percs slowly, flooding.	Ponding, percs slowly
Hr: Hurlock	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, soil blowing,	Wetness, too sandy, soil blowing

Table 16.—Water Management—Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions
IgA------------------- Ingleside	Severe: seepage.	Severe: piping.	Severe: slow refill, cutbanks cave.	Deep to water	Droughty, soil blowing.	Soil blowing--
IgB------------------- Ingleside	Severe: seepage.	Severe: piping.	Severe: slow refill, cutbanks cave.	Deep to water	Slope, droughty, soil blowing.	Soil blowing--
IgC------------------- Ingleside	Severe: seepage.	Severe: piping.	Severe: slow refill, cutbanks cave.	Deep to water	Slope, droughty, soil blowing.	Soil blowing--
Kn-------------------- Kentuck	Slight------	Severe: ponding.	Severe: slow refill.	Ponding, percs slowly.	Ponding, percs slowly.	Erodes easily ponding, percs slowly
Lo-------------------- Longmarsh	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, flooding, frost action.	Ponding, droughty, flooding.	Ponding, too sandy.
LZ:						
Longmarsh-----------	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, flooding, frost action.	Ponding, droughty, flooding.	Ponding, too sandy.
Zekiah--------------	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Flooding, too acid.	Wetness, erodes easily, flooding.	Erodes easily wetness.
MkA------------------- Matapeake	Moderate: seepage.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily
MkB------------------- Matapeake	Moderate: seepage, slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Erodes easily
MkC------------------- Matapeake	Moderate: seepage, slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Erodes easily
MtA:						
Mattapex------------	Severe: seepage.	Severe: piping, wetness.	Severe: slow refill, cutbanks cave.	Favorable------	Wetness, erodes easily.	Erodes easily wetness.

Table 16.–Water Management–Continued

Map symbol and soil name	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
MtA: Butlertown	Moderate: seepage.	Severe: piping.	Severe: no water.	Percs slowly, frost action.	Wetness, percs slowly, rooting depth.	Erodes easily wetness, rooting depth
MtB: Mattapex	Severe: seepage.	Severe: piping, wetness.	Severe: slow refill, cutbanks cave.	Slope	Slope, wetness, erodes easily.	Erodes easily wetness.
Butlertown	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily wetness, rooting depth
MtC: Mattapex	Severe: seepage.	Severe: piping, wetness.	Severe: slow refill, cutbanks cave.	Slope	Slope, wetness, erodes easily.	Erodes easily wetness.
M-W. Miscellaneous water						
NsA: Nassawango	Moderate: seepage.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily
NsB: Nassawango	Moderate: seepage, slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Erodes easily
Ot: Othello	Severe: seepage.	Severe: thin layer, wetness.	Severe: slow refill, cutbanks cave.	Favorable	Wetness, rooting depth, erodes easily.	Erodes easily wetness.
PiA: Pineyneck	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Cutbanks cave, too acid.	Wetness, rooting depth, erodes easily.	Erodes easily wetness, too sandy.
PiB: Pineyneck	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Slope, cutbanks cave, too acid.	Slope, wetness, rooting depth.	Erodes easily wetness, too sandy.
PiC: Pineyneck	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Slope, cutbanks cave, too acid.	Slope, wetness, rooting depth.	Erodes easily wetness, too sandy.
Pk: Puckum	Severe: seepage.	Severe: excess humus, ponding.	Slight	Ponding, flooding, subsides.	Ponding, flooding, too acid.	Ponding

Table 16.—Water Management—Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions
UbB------------------ Udorthents	Slight------	Severe: piping.	Severe: no water.	Deep to water	Soil blowing, percs slowly.	Soil blowing percs slowl
UdB:						
Udorthents-----------	Slight------	Severe: piping.	Severe: no water.	Deep to water	Soil blowing, percs slowly.	Soil blowing percs slowl
Sulfaquents.						
UlB. Udorthents						
UoA------------------ Unicorn	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Favorable------	Favorable---
UoB------------------ Unicorn	Severe: seepage.	Severe: piping, seepage.	Severe: cutbanks cave.	Deep to water	Slope----------	Favorable---
Ur. Urban land						
UsA:						
Unicorn-------------	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Favorable------	Favorable---
Sassafras-----------	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Favorable------	Erodes easil
UsB:						
Unicorn-------------	Severe: seepage.	Severe: piping, seepage.	Severe: cutbanks cave.	Deep to water	Slope----------	Favorable---
Sassafras-----------	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Slope----------	Erodes easil
UsC:						
Unicorn-------------	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Slope----------	Favorable---
Sassafras-----------	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Slope----------	Erodes easil too sandy.

Table 16.—Water Management—Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions
W. Water						
Wh------------------- Whitemarsh	Slight------	Severe: piping, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, frost action.	Wetness, percs slowly, rooting depth.	Erodes easil wetness, percs slowl

Table 17.—Engineering Index Properties, Part I

(Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth (In)	USDA texture	Classification: Unified	Classification: AASHTO
Bp------ Bestpitch	0-5	peat	PT	A-8
	5-25	MPT, muck	PT	A-8
	25-37	muck, MPT	PT	A-8
	37-72	SIC, SICL	CL, CH	A-6, A-7
Ca------ Carmichael	0-15	L	CL-ML, ML	A-4
	15-19	L, SIL	ML, CL-ML, CL	A-4
	19-33	L, SIL, FSL	ML, CL-ML	A-4
	33-72	SR S, SL	SM, SP-SM, SC	A-2, A-3, A-4, A-6
Co------ Corsica	0-12	MK-L	OL, CL-ML, ML	A-4
	12-18	L, SIL, SL	SC-SM, SC, CL-ML	A-4, A-2-4, A-2
	18-40	CL, SCL, L, SL	SC, CL-ML, CL, SC-SM	A-4, A-6
	40-48	SL, SCL, GR-L	SC, CL, CL-ML	A-2, A-4
	48-72	SR GR-S, CL	SM, SP-SM, SC-SM	A-1, A-3, A-6, A-4
DhC:				
Downer------	0-5	SL	SM, SC-SM	A-2, A-4
	5-28	SL	SM, SC, SC-SM	A-2, A-4
	28-40	SR GRV-LS, SL	GM, SM, SP-SM, GP-GM	A-3, A-1, A-2
	40-72	SR GR-S, LS	SC, SM, SP-SM, SC-SM	A-1, A-2, A-3, A-4
Hammonton------	0-11	SL	SM, SC-SM	A-2, A-4
	11-24	SL, GR-SL	SC, SC-SM	A-2, A-1, A-4
	24-72	SR GRV-S, SCL	SM, SP-SM, SC-SM, GM	A-2, A-1, A-4, A-3
DoB------ Downer	0-6	SL	SM, SC-SM	A-2, A-4
	6-30	SL	SM, SC, SC-SM	A-2, A-4
	30-38	SR GRV-LS, SL	GM, SM, SP-SM, GP-GM	A-3, A-1, A-2
	38-72	SR GR-S, LS	SC, SM, SP-SM, SC-SM	A-1, A-2, A-3, A-4
DOE------ Downer	0-10	LS, SL	SM, SP-SM	A-2, A-1
	10-22	SL	SM, SC, SC-SM	A-2, A-4
	22-60	SR GRV-LS, SL	GM, SM, SP-SM, GP-GM	A-3, A-1, A-2
	60-72	SR GR-S, LS	SC, SM, SP-SM, SC-SM	A-1, A-2, A-3, A-4
DUD:				
Downer------	0-12	SL	SM, SC-SM	A-2, A-4
	12-24	SL	SM, SC, SC-SM	A-2, A-4
	24-54	SR GRV-LS, SL	GM, SM, SP-SM, GP-GM	A-3, A-1, A-2
	54-72	SR GR-S, LS	SC, SM, SP-SM, SC-SM	A-1, A-2, A-3, A-4
Unicorn------	0-6	L	ML, CL-ML	A-4
	6-28	SIL, L	ML, CL-ML	A-4
	28-47	SL, L	SC-SM, SM, ML	A-4
	47-68	LS, S, GR-SL	SM, SC-SM	A-1, A-2
	68-72	SR GR-LS, SIL	SM, ML, CL-ML	A-4, A-2, A-6
Fg------ Fallsington	0-16	L, SL	SM, ML, CL-ML, SC-SM	A-4
	16-37	L, SCL, CL	SM, SC, CL, ML	A-2, A-4, A-6
	37-72	SR S, SCL	SM, SP-SM, CL, CL-ML	A-2, A-3, A-4
FmA------ Fort Mott	0-22	LS	SM, SP-SM	A-2
	22-60	SL, SCL	SM, SC, SC-SM	A-2, A-4, A-6
	60-72	SR GR-SL, S, LS	SM, SC-SM, SP-SM	A-1, A-2, A-3
FmB------ Fort Mott	0-26	LS	SM, SP-SM	A-2
	26-44	SL, SCL, COSL	SM, SC, SC-SM	A-2, A-4, A-6
	44-72	SR GR-SL, S, LS	SM, SC-SM, SP-SM	A-1, A-2, A-3

Table 17.—Engineering Index Properties, Part I—Continued

Map symbol and soil name	Depth (In)	USDA texture	Classification: Unified	Classification: AASHTO
GfB:				
Galestown	0-10	LS	SP-SM, SM	A-1, A-2, A-3
	10-32	LS, S, LFS	SM, SP-SM	A-1, A-2, A-3
	32-72	S, LS, GR-S	SP, SP-SM	A-1, A-3, A-2
Fort Mott	0-22	LS	SM, SP-SM	A-2
	22-40	SL, SCL, COSL	SM, SC, SC-SM	A-2, A-4, A-6
	40-72	SR GR-SL, S, LS	SM, SC-SM, SP-SM	A-1, A-2, A-3
GfC:				
Galestown	0-10	LS	SP-SM, SM	A-1, A-2, A-3
	10-32	LS, S, LFS	SM, SP-SM	A-1, A-2, A-3
	32-72	S, LS, GR-S	SP, SP-SM	A-1, A-3, A-2
Fort Mott	0-26	LS	SM, SP-SM	A-2
	26-44	SL, SCL, COSL	SM, SC, SC-SM	A-2, A-4, A-6
	44-72	SR GR-SL, S, LS	SM, SC-SM, SP-SM	A-1, A-2, A-3
GrA	0-12	L	ML, CL-ML, SM	A-4
Greenwich	12-38	L, SL	ML, CL, CL-ML, SM	A-4
	38-47	SL, LS	SM, SC, SC-SM	A-2, A-4
	47-72	LS, LCOS, COS	SP, SM	A-1, A-2, A-3
HnA	0-11	SL	SM, SC-SM	A-2, A-4
Hammonton	11-24	SL, GR-SL	SC, SC-SM	A-2, A-1, A-4
	24-72	SR LS, SL, SCL	SM, SC-SM, GM	A-2, A-1, A-4
HnB	0-11	SL	SM, SC-SM	A-2, A-4
Hammonton	11-24	SL, GR-SL	SC, SC-SM	A-2, A-1, A-4
	24-72	SR LS, SL, SCL	SM, SC-SM, GM	A-2, A-1, A-4
Ho	0-12	peat	PT	A-8
Honga	12-19	MPT, muck	PT	A-8
	19-26	L, SL	CL-ML, SC-SM, CL	A-4
	26-72	SICL, CL, SCL	ML	A-6, A-7
Hr	0-10	SL	SC-SM, SP-SM, SM	A-2, A-1
Hurlock	10-31	SL	SM, SC, SC-SM	A-2, A-4, A-1
	31-72	S, LS, L, COS	SM, SP-SM	A-2, A-1
IgA	0-8	SL	SM, SC, SP-SM	A-2, A-1
Ingleside	8-26	SL, SCL	SM, SC, SC-SM	A-2, A-4
	26-72	LS, S, SL	SM, SP-SM	A-2, A-1
IgB	0-10	SL	SM, SC, SP-SM	A-2, A-1
Ingleside	10-38	SL, SCL	SM, SC, SC-SM	A-2, A-4
	38-59	LS, S, LFS	SM, SP-SM	A-2, A-1
	59-72	SR SL, L, LS	SC-SM, CL-ML	A-4, A-6
IgC	0-4	SL	SM, SC, SP-SM	A-2, A-1
Ingleside	4-36	SL, SCL	SM, SC, SC-SM	A-2, A-4
	36-60	LS, S, SL	SM, SP-SM	A-2, A-1
	60-72	SR SL, L, LS	SC-SM, CL-ML	A-4, A-6
Kn	0-10	MK-SIL	OL, ML, CL-ML	A-4, A-8
Kentuck	10-14	SIL	CL, CL-ML	A-4, A-6
	14-72	SIL, SICL	CL	A-6, A-7
Lo	0-19	MK-L	OL, CL-ML, SM	A-2-4, A-4
Longmarsh	19-34	SL, LS, FSL, GR-SL	SM, SP-SM	A-4, A-2-4, A-1
	34-66	SR GR-LS, COS	SM, SP-SM, SP	A-3, A-2-4, A-1

Table 17.—Engineering Index Properties, Part I—Continued

Map symbol and soil name	Depth (In)	USDA texture	Classification: Unified	Classification: AASHTO
LZ:				
Longmarsh	0-19	MK-L	OL, CL-ML, SM	A-2-4, A-4
	19-34	SL, LS, FSL, GR-SL	SM, SP-SM	A-4, A-2-4, A-1
	34-66	SR GR-LS, COS	SM, SP-SM, SP	A-3, A-2-4, A-1
Zekiah	0-4	SIL	ML, CL-ML	A-4
	4-17	SIL, L	ML, CL-ML	A-4
	17-40	SR SL, LS, GRV-COS	SM	A-2, A-4, A-2-4
	40-56	MK-SL, SL, MK-L	SM	A-2-4, A-4
	56-72	L, SL, SIL, GRV-LS	SM, ML, CL-ML	A-4, A-2-4
MkA Matapeake	0-12	SIL	ML, CL-ML, CL	A-4
	12-64	SIL, SICL, L	CL	A-6
	64-72	SL, LS, S	SM	A-2, A-4, A-3
MkB Matapeake	0-10	SIL	ML, CL-ML, CL	A-4
	10-62	SIL, SICL, L	CL	A-6
	62-72	SL, LS, S	SM	A-2, A-4, A-3
MkC Matapeake	0-10	SIL	ML, CL-ML, CL	A-4
	10-62	SIL, SICL, L	CL	A-6
	62-72	SL, LS, S	SM	A-2, A-4, A-3
MtA:				
Mattapex	0-12	SIL	CL-ML, CL	A-4
	12-37	SICL, SIL	CL, CL-ML	A-4, A-6, A-7
	37-72	FSL, L, LS	SM, SC, CL, ML	A-2, A-4, A-6
Butlertown	0-11	SIL	ML	A-4
	11-16	SIL, SICL, VFSL	ML, CL	A-4, A-6
	16-48	SIL, FSL, L	CL, CL-ML	A-4, A-6
	48-72	SIL, L, LFS	ML, SM, CL-ML	A-2, A-4
MtB:				
Mattapex	0-12	SIL	CL-ML, CL	A-4
	12-37	SICL, SIL	CL, CL-ML	A-4, A-6, A-7
	37-72	FSL, L, LS	SM, SC, CL, ML	A-2, A-4, A-6
Butlertown	0-16	SIL	ML	A-4
	16-29	SIL, SICL, VFSL	ML, CL	A-4, A-6
	29-48	SIL, FSL, L	CL, CL-ML	A-4, A-6
	48-72	SIL, L, LFS	ML, SM, CL-ML	A-2, A-4
MtC Mattapex	0-12	SIL	CL-ML, CL	A-4
	12-37	SICL, SIL	CL, CL-ML	A-4, A-6, A-7
	37-72	FSL, L, LS	SM, SC, CL, ML	A-2, A-4, A-6
M-W. Miscellaneous water				
NsA Nassawango	0-10	SIL	CL-ML, SC-SM	A-4
	10-40	SICL, SIL	CL	A-7, A-6
	40-72	FS, SL, SIL, LS	SM, SC-SM	A-4
NsB Nassawango	0-8	SIL	CL-ML, SC-SM	A-4
	8-40	SICL, SIL	CL	A-7, A-6
	40-72	FS, SL, LS, SIL	SM, SC-SM	A-4
Ot Othello	0-12	SIL	ML, CL-ML, SM, CL	A-4, A-6
	12-38	SICL, SIL	CL	A-6
	38-72	S, LS, LFS	SM, SP-SM	A-1, A-2

Table 17.—Engineering Index Properties, Part I—Continued

Map symbol and soil name	Depth (In)	USDA texture	Classification: Unified	Classification: AASHTO
PiA: Pineyneck	0-14	SIL	ML, CL-ML, CL	A-4
	14-27	L, SIL	ML, CL-ML, CL	A-4
	27-32	L, FSL, SL	SC-SM, CL, CL-ML, ML	A-4, A-2-4
	32-47	LS, S, LFS	SM, SC-SM	A-2-4
	47-72	SR SIL, SL, L	SC-SM, CL, CL-ML, ML	A-6, A-2-4, A-2-6
PiB: Pineyneck	0-14	SIL	ML, CL-ML, CL	A-4
	14-27	L, SIL	ML, CL-ML, CL	A-4
	27-32	L, FSL, SL	SC-SM, CL, CL-ML, ML	A-4, A-2-4
	32-47	LS, S, LFS	SM, SC-SM	A-2-4
	47-72	SR SIL, SL, L	SC-SM, CL, CL-ML, ML	A-6, A-2-4, A-2-6
PiC: Pineyneck	0-14	SIL	ML, CL-ML, CL	A-4
	14-27	L, SIL	ML, CL-ML, CL	A-4
	27-32	L, FSL, SL, L	SC-SM, CL, CL-ML, ML	A-4, A-2-4
	32-47	LS, S, LFS	SM, SC-SM	A-2-4
	47-72	SR SIL, SL, L	SC-SM, CL, CL-ML, ML	A-6, A-2-4, A-2-6
Pk: Puckum	0-12	MPT	PT	A-8
	12-72	muck, MPT	PT	A-8
UbB: Udorthents	0-2	SL	SM, SC-SM, ML	A-2, A-4
	2-65	SL, L	CL, CL-ML	A-4, A-6
UdB:				
Udorthents	0-2	SL	SM, SC-SM, ML	A-2, A-4
	2-65	SL, L	CL, CL-ML	A-4, A-6
Sulfaquents.				
UlB. Udorthents				
UoA: Unicorn	0-11	SIL	ML, CL-ML	A-4
	11-24	SIL, L	ML, CL-ML	A-4
	24-35	SL, L	SC-SM, SM, ML	A-4
	35-51	LS, S, GR-SL	SM, SC-SM	A-1, A-2
	51-72	SR GR-LS, SIL	SM, ML, CL-ML	A-4, A-2, A-6
UoB: Unicorn	0-10	SIL	ML, CL-ML	A-4
	10-20	SIL, L	ML, CL-ML	A-4
	20-28	SL, L	SC-SM, SM, ML	A-4
	28-38	LS, S, GR-SL	SM, SC-SM	A-1, A-2
	38-72	SR GR-LS, SIL	SM, ML, CL-ML	A-4, A-2, A-6
Ur. Urban land				
UsA:				
Unicorn	0-11	L	ML, CL-ML	A-4
	11-24	SIL, L	ML, CL-ML	A-4
	24-35	SL, L	SC-SM, SM, ML	A-4
	35-51	LS, S, GR-SL	SM, SC-SM	A-1, A-2
	51-72	SR GR-LS, SIL	SM, ML, CL-ML	A-4, A-2, A-6
Sassafras	0-10	L	ML, CL, CL-ML	A-4
	10-50	L, SCL, SL	SC-SM, CL, SC, CL-ML	A-2, A-4, A-6
	50-72	SR S, GR-SL, LS	SP-SM, SC, SM, SC-SM	A-1, A-2, A-4, A-3

Table 17.—Engineering Index Properties, Part I—Continued

Map symbol and soil name	Depth (In)	USDA texture	Classification	
			Unified	AASHTO
UsB:				
Unicorn	0-10	L	ML, CL-ML	A-4
	10-20	SIL, L	ML, CL-ML	A-4
	20-28	SL, L	SC-SM, SM, ML	A-4
	28-38	LS, S, GR-SL	SM, SC-SM	A-1, A-2
	38-72	SR GR-LS, SIL	SM, ML, CL-ML	A-4, A-2, A-6
Sassafras	0-10	L	ML, CL, CL-ML	A-4
	10-50	L, SCL, SL	SC-SM, CL, SC, CL-ML	A-2, A-4, A-6
	50-72	SR S, GR-SL, LS	SP-SM, SC, SM, SC-SM	A-1, A-2, A-4, A-3
UsC:				
Unicorn	0-10	L	ML, CL-ML	A-4
	10-21	SIL, L	ML, CL-ML	A-4
	21-38	SL, L	SC-SM, SM, ML	A-4
	38-60	LS, S, GR-SL	SM, SC-SM	A-1, A-2
	60-72	SR GR-LS, SIL	SM, ML, CL-ML	A-4, A-2, A-6
Sassafras	0-6	L	ML, CL, CL-ML	A-4
	6-34	L, SCL, SL	SC-SM, CL, SC, CL-ML	A-2, A-4, A-6
	34-72	SR S, GR-SL, LS	SP-SM, SC, SM, SC-SM	A-1, A-2, A-4, A-3
W. Water				
Wh Whitemarsh	0-12	SIL	CL-ML, ML	A-4
	12-62	SIL, SICL	CL, CL-ML	A-4, A-6
	62-72	SR S, LS, L, SICL	ML, CL, CL-ML	A-4

Table 17.—Engineering Index Properties, Part II

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth (In)	Fragments >3 inches (Pct)	Percent passing sieve number-- 4	10	40	200	Liquid limit (Pct)	Plasticity index
Bp----------------------	0-5	0	---	---	---	---	---	---
Bestpitch	5-25	0	---	---	---	---	---	---
	25-37	0	---	---	---	---	---	---
	37-72	0	100	100	100	70-95	35-60	20-35
Ca----------------------	0-15	0	95-100	95-100	55-95	45-85	10-30	0-10
Carmichael	15-19	0	95-100	95-100	60-95	50-90	10-30	0-10
	19-33	0	95-100	95-100	50-95	35-90	10-30	0-10
	33-72	0	85-100	80-100	20-75	5-40	0-30	0-15
Co----------------------	0-12	0	95-100	95-100	70-90	45-90	10-20	0-5
Corsica	12-18	0	95-100	95-100	40-90	30-90	10-20	5-10
	18-40	0	95-100	95-100	75-95	35-75	20-30	5-15
	40-48	0	55-100	45-100	40-95	20-75	0-30	0-10
	48-72	0	45-100	45-100	20-90	5-85	0-40	0-15
DhC:								
Downer-----------------	0-5	0	80-100	75-100	50-70	25-45	15-20	0-4
	5-28	0	80-100	75-100	45-70	25-40	15-25	0-8
	28-40	0	45-100	35-100	20-70	5-15	10-15	0-4
	40-72	0	75-100	70-100	35-90	5-55	10-30	0-10
Hammonton--------------	0-11	0	90-100	85-100	50-70	25-40	15-20	0-4
	11-24	0	80-100	70-100	40-90	20-40	20-25	4-8
	24-72	0	60-100	45-100	20-80	5-50	10-30	0-10
DoB---------------------	0-6	0	80-100	75-100	50-70	25-45	15-20	0-4
Downer	6-30	0	80-100	75-100	45-70	25-40	15-25	0-8
	30-38	0	45-100	35-100	20-70	5-15	10-15	0-4
	38-72	0	75-100	70-100	35-90	5-55	10-30	0-10
DOE---------------------	0-10	0	80-100	75-100	40-75	10-30	15-20	0-4
Downer	10-22	0	80-100	75-100	45-70	25-40	15-25	0-8
	22-60	0	45-100	35-100	20-70	5-15	10-15	0-4
	60-72	0	75-100	70-100	35-90	5-55	10-30	0-10
DUD:								
Downer-----------------	0-12	0	80-100	75-100	50-70	25-45	15-20	0-4
	12-24	0	80-100	75-100	45-70	25-40	15-25	0-8
	24-54	0	45-100	35-100	20-70	5-15	10-15	0-4
	54-72	0	75-100	70-100	35-90	5-55	10-30	0-10
Unicorn----------------	0-6	0	95-100	90-100	70-95	50-85	10-25	0-10
	6-28	0	95-100	90-100	70-90	55-85	15-30	0-10
	28-47	0	85-100	85-100	60-85	40-70	10-20	0-10
	47-68	0	80-100	65-100	30-85	15-35	5-10	0-5
	68-72	0	75-100	65-100	30-95	20-90	5-30	0-15
Fg----------------------	0-16	0	95-100	90-100	65-90	40-70	0-20	0-10
Fallsington	16-37	0	95-100	90-100	65-85	30-55	0-30	0-15
	37-72	0	95-100	90-100	50-85	5-55	0-30	0-15
FmA---------------------	0-22	0	90-100	85-100	50-90	10-25	15-20	0-3
Fort Mott	22-60	0	90-100	80-100	50-90	25-45	20-35	3-12
	60-72	0	80-100	75-100	40-80	5-35	15-25	0-6
FmB---------------------	0-26	0	90-100	85-100	50-90	10-25	15-20	0-3
Fort Mott	26-44	0	90-100	80-100	50-90	25-45	20-35	3-12
	44-72	0	80-100	75-100	40-80	5-35	15-25	0-6

Table 17.—Engineering Index Properties, Part II—Continued

Map symbol and soil name	Depth (In)	Fragments >3 inches (Pct)	Percent passing sieve number-- 4	10	40	200	Liquid limit (Pct)	Plasticity index
GfB:								
Galestown	0-10	0	95-100	75-100	45-70	4-20	0-14	0-0
	10-32	0	95-100	95-100	45-75	4-20	0-14	0-0
	32-72	0	75-100	55-100	30-75	4-10	0-14	0-0
Fort Mott	0-22	0	90-100	85-100	50-90	10-25	15-20	0-3
	22-40	0	90-100	80-100	50-90	25-45	20-35	3-12
	40-72	0	80-100	75-100	40-80	5-35	15-25	0-6
GfC:								
Galestown	0-10	0	95-100	75-100	45-70	4-20	0-14	0-0
	10-32	0	95-100	95-100	45-75	4-20	0-14	0-0
	32-72	0	75-100	55-100	30-75	4-10	0-14	0-0
Fort Mott	0-26	0	90-100	85-100	50-90	10-25	15-20	0-3
	26-44	0	90-100	80-100	50-90	25-45	20-35	3-12
	44-72	0	80-100	75-100	40-80	5-35	15-25	0-6
GrA: Greenwich	0-12	0	85-100	80-100	70-95	35-60	8-25	0-10
	12-38	0	85-100	80-100	70-95	40-75	12-32	0-10
	38-47	0	85-100	75-100	50-85	25-40	10-20	0-8
	47-72	0	80-100	70-100	30-80	2-30	5-12	0-3
HnA: Hammonton	0-11	0	90-100	85-100	50-70	25-40	15-20	0-4
	11-24	0	80-100	70-100	40-90	20-40	20-25	4-8
	24-72	0	75-100	70-100	40-80	20-50	10-30	0-10
HnB: Hammonton	0-11	0	90-100	85-100	50-70	25-40	15-20	0-4
	11-24	0	80-100	70-100	40-90	20-40	20-25	4-8
	24-72	0	75-100	70-100	40-80	20-50	10-30	0-10
Ho: Honga	0-12	0	---	---	---	---	---	---
	12-19	0	---	---	---	---	---	---
	19-26	0	85-100	80-100	50-95	25-75	20-33	5-20
	26-72	0	100	100	90-100	80-95	35-50	0-15
Hr: Hurlock	0-10	0	100	90-100	40-90	10-35	0-25	0-10
	10-31	0	90-100	90-95	40-90	20-50	10-25	0-10
	31-72	0	80-100	75-100	20-70	5-30	0-20	0-5
IgA: Ingleside	0-8	0	90-100	80-100	40-75	10-35	10-30	0-15
	8-26	0	90-100	80-100	50-90	20-40	10-25	0-10
	26-72	0	80-100	60-100	20-70	5-30	15-20	0-5
IgB: Ingleside	0-10	0	90-100	80-100	40-75	10-35	10-30	0-15
	10-38	0	90-100	80-100	50-90	20-40	10-25	0-10
	38-59	0	80-100	60-100	20-70	5-30	15-20	0-5
	59-72	0	95-100	90-100	70-90	40-85	10-30	5-15
IgC: Ingleside	0-4	0	90-100	80-100	40-75	10-35	10-30	0-15
	4-36	0	90-100	80-100	50-90	20-40	10-25	0-10
	36-60	0	80-100	60-100	20-70	5-30	15-20	0-5
	60-72	0	95-100	90-100	70-90	40-85	10-30	5-15
Kn: Kentuck	0-10	0	100	100	90-100	75-90	25-35	5-10
	10-14	0	100	100	90-100	75-90	25-40	5-15
	14-72	0	100	100	90-100	75-95	35-45	15-20
Lo: Longmarsh	0-19	0	85-100	75-100	40-90	15-70	15-20	0-5
	19-34	0	75-100	45-100	25-90	10-45	8-20	0-6
	34-66	0	75-100	45-100	10-75	0-30	0	0-0

Table 17.—Engineering Index Properties, Part II—Continued

Map symbol and soil name	Depth (In)	Fragments >3 inches (Pct)	Percent passing sieve number-- 4	10	40	200	Liquid limit (Pct)	Plasticity index
LZ:								
Longmarsh	0-19	0	85-100	75-100	40-90	15-70	15-20	0-5
	19-34	0	75-100	45-100	25-90	10-45	8-20	0-6
	34-66	0	75-100	45-100	10-75	0-30	0	0-0
Zekiah	0-4	0	100	100	70-100	45-100	15-25	0-10
	4-17	0	100	100	70-100	45-100	15-25	0-10
	17-40	0	90-100	75-100	50-95	25-75	15-26	0-10
	40-56	0	90-100	75-100	50-70	25-45	15-26	0-10
	56-72	0	90-100	75-100	35-70	25-50	15-25	0-10
MkA Matapeake	0-12	0	100	100	80-100	80-100	20-33	3-9
	12-64	0	100	100	80-100	80-100	27-45	10-22
	64-72	0	95-100	90-100	55-70	5-40	0-19	0-3
MkB Matapeake	0-10	0	100	100	80-100	80-100	20-33	3-9
	10-62	0	100	100	80-100	80-100	27-45	10-22
	62-72	0	95-100	90-100	55-70	5-40	0-19	0-3
MkC Matapeake	0-10	0	100	100	80-100	80-100	20-33	3-9
	10-62	0	100	100	80-100	80-100	27-45	10-22
	62-72	0	95-100	90-100	55-70	5-40	0-19	0-3
MtA:								
Mattapex	0-12	0	95-100	90-100	80-100	80-100	15-30	5-15
	12-37	0	100	100	90-100	85-95	24-45	7-21
	37-72	0	95-100	90-100	45-95	15-75	0-40	0-18
Butlertown	0-11	0	100	95-100	90-100	85-100	22-35	2-8
	11-16	0	100	95-100	90-100	85-100	33-40	9-16
	16-48	0	100	95-100	90-100	85-100	22-38	6-16
	48-72	0	90-100	85-100	75-100	30-90	0-30	0-10
MtB:								
Mattapex	0-12	0	95-100	90-100	80-100	80-100	15-30	5-15
	12-37	0	100	100	90-100	85-95	24-45	7-21
	37-72	0	95-100	90-100	45-95	15-75	0-40	0-18
Butlertown	0-16	0	100	95-100	90-100	85-100	22-35	2-8
	16-29	0	100	95-100	90-100	85-100	33-40	9-16
	29-48	0	100	95-100	90-100	85-100	22-38	6-16
	48-72	0	90-100	85-100	75-100	30-90	0-30	0-10
MtC Mattapex	0-12	0	95-100	90-100	80-100	80-100	15-30	5-15
	12-37	0	100	100	90-100	85-95	24-45	7-21
	37-72	0	95-100	90-100	45-95	15-75	0-40	0-18
M-W. Miscellaneous water								
NsA Nassawango	0-10	0	95-100	90-100	80-100	80-100	20-33	3-9
	10-40	0	100	100	80-100	80-100	27-45	10-22
	40-72	0	95-100	90-95	50-90	15-85	15-30	2-9
NsB Nassawango	0-8	0	95-100	90-100	80-100	80-100	20-33	3-9
	8-40	0	100	100	80-100	80-100	27-45	10-22
	40-72	0	95-100	90-95	50-90	15-85	15-30	2-9
Ot Othello	0-12	0	100	100	70-100	40-95	20-35	0-15
	12-38	0	100	100	90-100	70-95	29-40	10-19
	38-72	0	90-100	85-100	20-50	5-35	0-10	0-5

Table 17.—Engineering Index Properties, Part II—Continued

Map symbol and soil name	Depth (In)	Fragments >3 inches (Pct)	Percent passing sieve number-- 4	10	40	200	Liquid limit (Pct)	Plasticity index
PiA----------------------	0-14	0	90-100	80-100	75-95	50-80	10-30	0-10
Pineyneck	14-27	0	90-100	80-100	75-95	50-80	10-30	0-10
	27-32	0	90-100	80-100	70-85	25-80	10-30	0-10
	32-47	0	90-100	80-100	60-90	20-30	0-10	0-5
	47-72	0	90-100	80-100	65-95	20-80	0-30	0-15
PiB----------------------	0-14	0	90-100	80-100	75-95	50-80	10-30	0-10
Pineyneck	14-27	0	90-100	80-100	75-95	50-80	10-30	0-10
	27-32	0	90-100	80-100	70-85	25-80	10-30	0-10
	32-47	0	90-100	80-100	60-90	20-30	0-10	0-5
	47-72	0	90-100	80-100	65-95	20-80	0-30	0-15
PiC----------------------	0-14	0	90-100	80-100	75-95	50-80	10-30	0-10
Pineyneck	14-27	0	90-100	80-100	75-95	50-80	10-30	0-10
	27-32	0	90-100	80-100	70-85	25-80	10-30	0-10
	32-47	0	90-100	80-100	60-90	20-30	0-10	0-5
	47-72	0	90-100	80-100	65-95	20-80	0-30	0-15
Pk-----------------------	0-12	0	---	---	---	---	---	---
Puckum	12-72	0	---	---	---	---	---	---
UbB----------------------	0-2	0-5	85-100	80-100	50-85	25-55	15-25	0-5
Udorthents	2-65	0-5	85-100	80-100	70-95	50-75	15-30	5-15
UdB:								
Udorthents-------------	0-2	0-5	85-100	80-100	50-85	25-55	15-25	0-5
	2-65	0-5	85-100	80-100	70-95	50-75	15-30	5-15
Sulfaquents.								
UlB.								
Udorthents								
UoA----------------------	0-11	0	95-100	90-100	70-95	50-85	10-25	0-10
Unicorn	11-24	0	95-100	90-100	70-90	55-85	15-30	0-10
	24-35	0	85-100	85-100	60-85	40-70	10-20	0-10
	35-51	0	80-100	65-100	30-85	15-35	5-10	0-5
	51-72	0	75-100	65-100	30-95	20-90	5-30	0-15
UoB----------------------	0-10	0	95-100	90-100	70-95	50-85	10-25	0-10
Unicorn	10-20	0	95-100	90-100	70-90	55-85	15-30	0-10
	20-28	0	85-100	85-100	60-85	40-70	10-20	0-10
	28-38	0	80-100	65-100	30-85	15-35	5-10	0-5
	38-72	0	75-100	65-100	30-95	20-90	5-30	0-15
Ur.								
Urban land								
UsA:								
Unicorn----------------	0-11	0	95-100	90-100	70-95	50-85	10-25	0-10
	11-24	0	95-100	90-100	70-90	55-85	15-30	0-10
	24-35	0	85-100	85-100	60-85	40-70	10-20	0-10
	35-51	0	80-100	65-100	30-85	15-35	5-10	0-5
	51-72	0	75-100	65-100	30-95	20-90	5-30	0-15
Sassafras--------------	0-10	0	85-100	80-100	70-95	50-75	12-32	0-10
	10-50	0	85-100	80-100	50-95	25-75	20-33	5-15
	50-72	0	70-100	50-100	30-90	5-55	0-26	0-8

Table 17.—Engineering Index Properties, Part II—Continued

Map symbol and soil name	Depth (In)	Fragments >3 inches (Pct)	Percent passing sieve number-- 4	10	40	200	Liquid limit (Pct)	Plasticity index
UsB:								
Unicorn----------------	0-10	0	95-100	90-100	70-95	50-85	10-25	0-10
	10-20	0	95-100	90-100	70-90	55-85	15-30	0-10
	20-28	0	85-100	85-100	60-85	40-70	10-20	0-10
	28-38	0	80-100	65-100	30-85	15-35	5-10	0-5
	38-72	0	75-100	65-100	30-95	20-90	5-30	0-15
Sassafras--------------	0-10	0	85-100	80-100	70-95	50-75	12-32	0-10
	10-50	0	85-100	80-100	50-95	25-75	20-33	5-15
	50-72	0	70-100	50-100	30-90	5-55	0-26	0-8
UsC:								
Unicorn----------------	0-10	0	95-100	90-100	70-95	50-85	10-25	0-10
	10-21	0	95-100	90-100	70-90	55-85	15-30	0-10
	21-38	0	85-100	85-100	60-85	40-70	10-20	0-10
	38-60	0	80-100	65-100	30-85	15-35	5-10	0-5
	60-72	0	75-100	65-100	30-95	20-90	5-30	0-15
Sassafras--------------	0-6	0	85-100	80-100	70-95	50-75	12-32	0-10
	6-34	0	85-100	80-100	50-95	25-75	20-33	5-15
	34-72	0	70-100	50-100	30-90	5-55	0-26	0-8
W. Water								
Wh---------------------- Whitemarsh	0-12	0	100	100	80-100	80-95	10-20	0-5
	12-62	0	100	100	90-100	85-95	20-40	5-15
	62-72	0	100	95-100	65-100	65-90	0-30	0-10

Table 18.--Physical and Chemical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Org only to the surface layer. Absence of an entry indicates that data were not available or were not estimated

Map symbol and soil name	Depth (In)	Clay (Pct)	Moist bulk density (g/cc)	Permeability (In/hr)	Available water capacity (In/in)	Soil reaction (pH)	Salinity (mmhos/cm)	Shrink-swell potential	Erosion factors K	Erosion factors T
Bp-------------	0-5	0	0.10-0.50	2.00-20.00	0.30-0.60	6.1-7.3	8-32	Low------	0.02	2
Bestpitch	5-25	0	0.10-0.50	2.00-20.00	0.30-0.60	6.1-7.3	8-32	Low------	0.02	
	25-37	0	0.10-0.50	2.00-20.00	0.30-0.60	6.1-7.3	8-32	Low------	0.05	
	37-72	30-45	0.60-1.00	0.06-0.20	0.10-0.20	6.1-7.3	8-32	Moderate	0.10	
Ca-------------	0-15	5-18	1.10-1.55	0.60-2.00	0.15-0.20	3.6-5.5	0	Low------	0.37	3
Carmichael	15-19	8-22	1.40-1.65	0.60-2.00	0.18-0.24	3.6-5.5	0	Low------	0.43	
	19-33	10-18	1.65-1.85	0.06-0.20	0.05-0.14	3.6-5.5	0	Low------	0.43	
	33-72	2-20	1.40-1.75	0.60-20.00	0.05-0.20	3.6-5.5	0	Low------	0.20	
Co-------------	0-12	6-15	1.10-1.50	0.60-6.00	0.15-0.30	3.6-5.5	0	Low------	0.24	5
Corsica	12-18	10-15	1.20-1.70	0.60-2.00	0.12-0.20	3.6-5.5	0	Low------	0.32	
	18-40	18-30	1.30-1.70	0.20-6.00	0.10-0.24	3.6-5.5	0	Low------	0.32	
	40-48	5-25	1.30-1.70	0.20-2.00	0.10-0.20	3.6-5.5	0	Low------	0.24	
	48-72	0-35	1.50-1.80	0.20-20.00	0.05-0.20	3.6-5.5	0	Low------	0.10	
DhC:										
Downer---------	0-5	5-10	1.20-1.60	2.00-6.00	0.10-0.14	3.6-5.5	0	Low------	0.32	4
	5-28	6-18	1.45-1.65	2.00-6.00	0.08-0.13	4.5-5.5	0	Low------	0.32	
	28-40	3-5	1.40-1.75	6.00-20.00	0.02-0.08	4.5-5.5	0	Low------	0.17	
	40-72	3-25	1.40-1.75	0.60-20.00	0.02-0.16	4.5-5.5	0	Low------	0.20	
Hammonton------	0-11	5-10	1.20-1.60	2.00-6.00	0.10-0.14	3.6-5.5	0	Low------	0.32	5
	11-24	10-18	1.45-1.65	2.00-6.00	0.08-0.13	4.5-5.5	0	Low------	0.32	
	24-72	2-22	1.40-1.75	0.60-20.00	0.03-0.15	4.5-5.5	0	Low------	0.17	
DoB------------	0-6	5-10	1.20-1.60	2.00-6.00	0.10-0.14	3.6-5.5	0	Low------	0.32	4
Downer	6-30	6-18	1.45-1.65	2.00-6.00	0.08-0.13	4.5-5.5	0	Low------	0.32	
	30-38	3-5	1.40-1.75	6.00-20.00	0.02-0.08	4.5-5.5	0	Low------	0.17	
	38-72	3-25	1.40-1.75	0.60-20.00	0.02-0.16	4.5-5.5	0	Low------	0.20	
DOE------------	0-10	3-8	1.20-1.60	6.00-20.00	0.06-0.08	3.6-5.5	0	Low------	0.20	4
Downer	10-22	6-18	1.45-1.65	2.00-6.00	0.08-0.13	4.5-5.5	0	Low------	0.32	
	22-60	3-5	1.40-1.75	6.00-20.00	0.02-0.08	4.5-5.5	0	Low------	0.17	
	60-72	3-25	1.40-1.75	0.60-20.00	0.02-0.16	4.5-5.5	0	Low------	0.20	
DUD:										
Downer---------	0-12	5-10	1.20-1.60	2.00-6.00	0.10-0.14	3.6-5.5	0	Low------	0.32	4
	12-24	6-18	1.45-1.65	2.00-6.00	0.08-0.13	4.5-5.5	0	Low------	0.32	
	24-54	3-5	1.40-1.75	6.00-20.00	0.02-0.08	4.5-5.5	0	Low------	0.17	
	54-72	3-25	1.40-1.75	0.60-20.00	0.02-0.16	4.5-5.5	0	Low------	0.20	

Table 18.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth (In)	Clay (Pct)	Moist bulk density (g/cc)	Permeability (In/hr)	Available water capacity (In/in)	Soil reaction (pH)	Salinity (mmhos/cm)	Shrink-swell potential	Erosion factors K	Erosion factors T
DUD:										
Unicorn--------	0-6	7-15	1.30-1.60	0.60-6.00	0.12-0.22	3.6-5.0	0	Low------	0.32	5
	6-28	8-18	1.45-1.65	0.60-2.00	0.10-0.20	3.6-5.5	0	Low------	0.28	
	28-47	5-15	1.35-1.70	0.60-6.00	0.10-0.18	3.6-5.5	0	Low------	0.24	
	47-68	3-8	1.40-1.70	2.00-20.00	0.05-0.15	3.6-5.5	0	Low------	0.17	
	68-72	5-27	1.50-1.70	0.60-6.00	0.05-0.24	3.6-5.5	0	Low------	0.43	
Fg-------------- Fallsington	0-16	5-18	1.00-1.45	0.60-2.00	0.18-0.24	3.6-5.5	0	Low------	0.32	5
	16-37	18-30	1.50-1.80	0.20-2.00	0.15-0.18	3.6-5.5	0	Low------	0.28	
	37-72	2-30	1.50-1.85	0.60-20.00	0.06-0.20	3.6-5.5	0	Low------	0.20	
FmA------------- Fort Mott	0-22	5-10	1.25-1.60	6.00-20.00	0.05-0.10	3.6-5.5	0	Low------	0.20	5
	22-60	10-30	1.25-1.80	0.60-6.00	0.12-0.16	3.6-5.5	0	Low------	0.32	
	60-72	5-15	1.30-1.80	6.00-20.00	0.03-0.12	3.6-5.5	0	Low------	0.17	
FmB------------- Fort Mott	0-26	5-10	1.25-1.60	6.00-20.00	0.05-0.10	3.6-5.5	0	Low------	0.20	5
	26-44	10-30	1.25-1.80	0.60-6.00	0.12-0.16	3.6-5.5	0	Low------	0.32	
	44-72	5-15	1.30-1.80	6.00-20.00	0.03-0.12	3.6-5.5	0	Low------	0.17	
GfB:										
Galestown------	0-10	4-10	1.50-1.70	6.00-20.00	0.06-0.08	3.6-5.5	0	Low------	0.17	5
	10-32	4-10	1.50-1.70	6.00-20.00	0.04-0.08	3.6-5.5	0	Low------	0.17	
	32-72	2-6	1.50-1.65	6.00-20.00	0.04-0.08	3.6-5.5	0	Low------	0.17	
Fort Mott------	0-22	5-10	1.25-1.60	6.00-20.00	0.05-0.10	3.6-5.5	0	Low------	0.20	5
	22-40	10-30	1.25-1.80	0.60-6.00	0.12-0.16	3.6-5.5	0	Low------	0.32	
	40-72	5-15	1.30-1.80	6.00-20.00	0.03-0.12	3.6-5.5	0	Low------	0.17	
GfC:										
Galestown------	0-10	4-10	1.50-1.70	6.00-20.00	0.06-0.08	3.6-5.5	0	Low------	0.17	5
	10-32	4-10	1.50-1.70	6.00-20.00	0.04-0.08	3.6-5.5	0	Low------	0.17	
	32-72	2-6	1.50-1.65	6.00-20.00	0.04-0.08	3.6-5.5	0	Low------	0.17	
Fort Mott------	0-26	5-10	1.25-1.60	6.00-20.00	0.05-0.10	3.6-5.5	0	Low------	0.20	5
	26-44	10-30	1.25-1.80	0.60-6.00	0.12-0.16	3.6-5.5	0	Low------	0.32	
	44-72	5-15	1.30-1.80	6.00-20.00	0.03-0.12	3.6-5.5	0	Low------	0.17	
GrA------------- Greenwich	0-12	5-14	1.30-1.60	2.00-6.00	0.10-0.16	3.6-5.5	0	Low------	0.32	4
	12-38	6-18	1.40-1.70	2.00-6.00	0.12-0.20	3.6-5.5	0	Low------	0.32	
	38-47	3-14	1.40-1.65	2.00-6.00	0.08-0.14	3.6-5.5	0	Low------	0.24	
	47-72	2-10	1.45-1.85	2.00-20.00	0.02-0.10	3.6-5.5	0	Low------	0.17	
HnA------------- Hammonton	0-11	5-10	1.20-1.60	2.00-6.00	0.10-0.14	3.6-5.5	0	Low------	0.32	5
	11-24	10-18	1.45-1.65	2.00-6.00	0.08-0.13	4.5-5.5	0	Low------	0.32	
	24-72	2-22	1.40-1.75	0.60-20.00	0.03-0.15	4.5-5.5	0	Low------	0.17	

Table 18.—Physical and Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth (In)	Clay (Pct)	Moist bulk density (g/cc)	Permeability (In/hr)	Available water capacity (In/in)	Soil reaction (pH)	Salinity (mmhos/cm)	Shrink-swell potential	Erosion factors K	Erosion factors T
HnB-------------	0-11	5-10	1.20-1.60	2.00-6.00	0.10-0.14	3.6-5.5	0	Low------	0.32	5
Hammonton	11-24	10-18	1.45-1.65	2.00-6.00	0.08-0.13	4.5-5.5	0	Low------	0.32	
	24-72	2-22	1.40-1.75	0.60-20.00	0.03-0.15	4.5-5.5	0	Low------	0.17	
Ho--------------	0-12	0	0.10-0.50	2.00-20.00	0.30-0.60	6.1-7.3	16-32	Low------	0.02	2
Honga	12-19	0	0.10-0.50	2.00-20.00	0.30-0.60	6.1-7.3	16-32	Low------	0.02	
	19-26	15-30	1.40-1.70	0.06-0.60	0.10-0.20	6.1-7.3	4-32	Low------	0.10	
	26-72	28-40	1.40-1.70	0.06-0.20	0.10-0.20	6.1-7.3	4-32	Low------	0.28	
Hr--------------	0-10	5-12	1.20-1.60	2.00-6.00	0.10-0.16	3.6-5.5	0	Low------	0.15	5
Hurlock	10-31	8-18	1.55-1.75	2.00-6.00	0.10-0.16	3.6-5.5	0	Low------	0.24	
	31-72	3-8	1.40-1.70	2.00-20.00	0.05-0.10	3.6-5.5	0	Low------	0.15	
IgA-------------	0-8	5-12	1.20-1.60	2.00-6.00	0.10-0.16	3.6-5.5	---	Low------	0.20	5
Ingleside	8-26	8-25	1.45-1.65	2.00-6.00	0.10-0.16	3.6-5.5	---	Low------	0.28	
	26-72	3-8	1.40-1.70	2.00-20.00	0.05-0.10	3.6-5.5	---	Low------	0.15	
IgB-------------	0-10	5-12	1.20-1.60	2.00-6.00	0.10-0.16	3.6-5.5	---	Low------	0.20	5
Ingleside	10-38	8-25	1.45-1.65	2.00-6.00	0.10-0.16	3.6-5.5	---	Low------	0.28	
	38-59	3-8	1.40-1.70	2.00-20.00	0.05-0.10	3.6-5.5	---	Low------	0.15	
	59-72	12-15	1.50-1.70	0.60-6.00	0.12-0.24	3.6-5.5	---	Low------	0.49	
IgC-------------	0-4	5-12	1.20-1.60	2.00-6.00	0.10-0.16	3.6-5.5	---	Low------	0.20	5
Ingleside	4-36	8-25	1.45-1.65	2.00-6.00	0.10-0.16	3.6-5.5	---	Low------	0.28	
	36-60	3-8	1.40-1.70	2.00-20.00	0.05-0.10	3.6-5.5	---	Low------	0.15	
	60-72	12-15	1.50-1.70	0.60-6.00	0.12-0.24	3.6-5.5	---	Low------	0.49	
Kn--------------	0-10	14-18	1.20-1.50	0.60-2.00	0.20-0.25	3.6-5.5	0	Low------	0.24	4
Kentuck	10-14	14-20	1.40-1.70	0.60-2.00	0.15-0.21	3.6-5.5	0	Low------	0.43	
	14-72	24-34	1.40-1.70	0.06-0.60	0.15-0.21	3.6-5.5	0	Low------	0.43	
Lo--------------	0-19	8-15	1.30-1.50	0.60-2.00	0.18-0.30	3.6-5.5	0-2	Low------	0.15	4
Longmarsh	19-34	5-15	1.40-1.65	2.00-6.00	0.02-0.08	3.6-5.5	0-2	Low------	0.10	
	34-66	0-8	1.40-1.70	6.00-20.00	0.04-0.09	3.6-5.5	0-2	Low------	0.10	
LZ:										
Longmarsh------	0-19	8-15	1.30-1.50	0.60-2.00	0.18-0.30	3.6-5.5	0-2	Low------	0.15	4
	19-34	5-15	1.40-1.65	2.00-6.00	0.02-0.08	3.6-5.5	0-2	Low------	0.10	
	34-66	0-8	1.40-1.70	6.00-20.00	0.04-0.09	3.6-5.5	0-2	Low------	0.10	
Zekiah---------	0-4	8-15	1.20-1.50	0.60-2.00	0.12-0.22	3.6-5.5	0-2	Low------	0.43	5
	4-17	8-18	1.20-1.50	0.60-2.00	0.10-0.20	3.6-5.5	0-2	Low------	0.43	
	17-40	5-15	1.30-1.50	2.00-6.00	0.10-0.20	3.6-5.5	0-2	Low------	0.28	
	40-56	5-15	1.30-1.60	2.00-6.00	0.08-0.15	3.6-5.5	0-2	Low------	0.24	
	56-72	5-18	1.30-1.60	2.00-6.00	0.10-0.20	3.6-5.5	0-2	Low------	0.15	

Table 18.—Physical and Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth (In)	Clay (Pct)	Moist bulk density (g/cc)	Permeability (In/hr)	Available water capacity (In/in)	Soil reaction (pH)	Salinity (mmhos/cm)	Shrink-swell potential	Erosion factors K	Erosion factors T
MkA-------------	0-12	5-15	1.00-1.45	0.60-2.00	0.20-0.28	4.5-5.5	0	Low------	0.49	5
Matapeake	12-64	18-30	1.40-1.65	0.20-2.00	0.18-0.24	3.6-5.5	0	Low------	0.43	
	64-72	2-20	1.65-1.85	0.60-6.00	0.08-0.18	3.6-5.5	0	Low------	0.28	
MkB-------------	0-10	5-15	1.00-1.45	0.60-2.00	0.20-0.28	4.5-5.5	0	Low------	0.49	5
Matapeake	10-62	18-30	1.40-1.65	0.20-2.00	0.18-0.24	3.6-5.5	0	Low------	0.43	
	62-72	2-20	1.65-1.85	0.60-6.00	0.08-0.18	3.6-5.5	0	Low------	0.28	
MkC-------------	0-10	5-15	1.00-1.45	0.60-2.00	0.20-0.28	4.5-5.5	0	Low------	0.49	5
Matapeake	10-62	18-30	1.40-1.65	0.20-2.00	0.18-0.24	3.6-5.5	0	Low------	0.43	
	62-72	2-20	1.65-1.85	0.60-6.00	0.08-0.18	3.6-5.5	0	Low------	0.28	
MtA:										
Mattapex-------	0-12	10-18	1.10-1.45	0.60-2.00	0.20-0.28	3.6-5.5	0	Low------	0.43	5
	12-37	18-30	1.25-1.45	0.20-2.00	0.18-0.22	3.6-5.5	0	Low------	0.43	
	37-72	8-15	1.45-1.65	0.60-6.00	0.14-0.18	3.6-5.5	0	Low------	0.28	
Butlertown-----	0-11	11-16	1.35-1.55	0.60-2.00	0.18-0.21	4.5-6.0	0	Low------	0.43	4
	11-16	18-28	1.35-1.55	0.60-2.00	0.16-0.22	4.5-6.0	0	Low------	0.43	
	16-48	18-25	1.60-1.80	0.06-0.20	0.10-0.14	4.5-6.0	0	Low------	0.43	
	48-72	5-18	1.50-1.70	0.60-2.00	0.12-0.21	4.5-5.5	0	Low------	0.43	
MtB:										
Mattapex-------	0-12	10-18	1.10-1.45	0.60-2.00	0.20-0.28	3.6-5.5	0	Low------	0.43	5
	12-37	18-30	1.25-1.45	0.20-2.00	0.18-0.22	3.6-5.5	0	Low------	0.43	
	37-72	8-15	1.45-1.65	0.60-6.00	0.14-0.18	3.6-5.5	0	Low------	0.28	
Butlertown-----	0-16	11-16	1.35-1.55	0.60-2.00	0.18-0.21	4.5-6.0	0	Low------	0.43	4
	16-29	18-28	1.35-1.55	0.60-2.00	0.16-0.22	4.5-6.0	0	Low------	0.43	
	29-48	18-25	1.60-1.80	0.06-0.20	0.10-0.14	4.5-6.0	0	Low------	0.43	
	48-72	5-18	1.50-1.70	0.60-2.00	0.12-0.21	4.5-5.5	0	Low------	0.43	
M-W. Miscellaneous water										
MtC-------------	0-12	10-18	1.10-1.45	0.60-2.00	0.20-0.28	3.6-5.5	0	Low------	0.43	5
Mattapex	12-37	18-30	1.25-1.45	0.20-2.00	0.18-0.22	3.6-5.5	0	Low------	0.43	
	37-72	8-15	1.45-1.65	0.60-6.00	0.14-0.18	3.6-5.5	0	Low------	0.28	
NsA-------------	0-10	5-15	1.20-1.50	0.60-2.00	0.20-0.25	4.5-6.5	0	Low------	0.43	4
Nassawango	10-40	18-30	1.40-1.65	0.20-0.60	0.18-0.25	3.6-5.5	0	Low------	0.49	
	40-72	8-20	1.40-1.70	0.20-2.00	0.15-0.24	3.6-5.5	0	Low------	0.28	
NsB-------------	0-8	5-15	1.20-1.50	0.60-2.00	0.20-0.25	4.5-6.5	0	Low------	0.43	4
Nassawango	8-40	18-30	1.40-1.65	0.20-0.60	0.18-0.25	3.6-5.5	0	Low------	0.49	
	40-72	8-20	1.40-1.70	0.20-2.00	0.15-0.24	3.6-5.5	0	Low------	0.28	

Table 18.—Physical and Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth (In)	Clay (Pct)	Moist bulk density (g/cc)	Permeability (In/hr)	Available water capacity (In/in)	Soil reaction (pH)	Salinity (mmhos/cm)	Shrink-swell potential	Erosion factors K	Erosion factors T
Ot---------------	0-12	15-28	1.20-1.50	0.60-2.00	0.16-0.24	4.5-5.5	0	Low-------	0.37	5
Othello	12-38	18-30	1.40-1.70	0.20-0.60	0.12-0.24	3.6-5.5	0	Low-------	0.43	
	38-72	4-10	1.65-1.80	2.00-6.00	0.06-0.10	3.6-5.5	0	Low-------	0.15	
PiA--------------	0-14	7-18	1.20-1.60	0.60-2.00	0.14-0.22	3.6-5.5	0	Low-------	0.43	5
Pineyneck	14-27	7-22	1.25-1.80	0.60-2.00	0.14-0.22	3.6-5.5	0	Low-------	0.49	
	27-32	7-18	1.35-1.70	0.60-2.00	0.12-0.20	3.6-5.5	0	Low-------	0.24	
	32-47	3-10	1.40-1.70	0.60-20.00	0.05-0.10	3.6-5.5	0	Low-------	0.15	
	47-72	3-25	1.35-1.85	0.60-20.00	0.12-0.24	3.6-5.5	0	Low-------	0.43	
PiB--------------	0-14	7-18	1.20-1.60	0.60-2.00	0.14-0.22	3.6-5.5	0	Low-------	0.43	5
Pineyneck	14-27	7-22	1.25-1.80	0.60-2.00	0.14-0.22	3.6-5.5	0	Low-------	0.49	
	27-32	7-18	1.35-1.70	0.60-2.00	0.12-0.20	3.6-5.5	0	Low-------	0.24	
	32-47	3-10	1.40-1.70	0.60-20.00	0.05-0.10	3.6-5.5	0	Low-------	0.15	
	47-72	3-25	1.35-1.85	0.60-20.00	0.12-0.24	3.6-5.5	0	Low-------	0.43	
PiC--------------	0-14	7-18	1.20-1.60	0.60-2.00	0.14-0.22	3.6-5.5	0	Low-------	0.43	5
Pineyneck	14-27	7-22	1.25-1.80	0.60-2.00	0.14-0.22	3.6-5.5	0	Low-------	0.49	
	27-32	7-18	1.35-1.70	0.60-2.00	0.12-0.20	3.6-5.5	0	Low-------	0.24	
	32-47	3-10	1.40-1.70	0.60-20.00	0.05-0.10	3.6-5.5	0	Low-------	0.15	
	47-72	3-25	1.35-1.85	0.60-20.00	0.12-0.24	3.6-5.5	0	Low-------	0.43	
Pk---------------	0-12	0	0.10-0.50	2.00-6.00	0.35-0.45	3.6-5.5	0-4	Low-------	0.02	3
Puckum	12-72	0	0.10-0.50	2.00-6.00	0.35-0.45	3.6-5.5	0-4	Low-------	0.02	
UbB--------------	0-2	6-15	0.00	0.06-0.60	0.10-0.13	4.5-5.0	0	Low-------	0.28	5
Udorthents	2-65	8-20	0.00	0.06-0.60	0.12-0.15	4.5-5.0	0	Moderate	0.28	
UdB:										
Udorthents------	0-2	6-15	0.00	0.06-0.60	0.10-0.13	4.5-5.0	0	Low-------	0.28	5
	2-65	8-20	0.00	0.06-0.60	0.12-0.15	4.5-5.0	0	Moderate	0.28	
Sulfaquents.										
UlB.										
Udorthents										
UoA--------------	0-11	7-15	1.30-1.60	0.60-6.00	0.12-0.22	3.6-5.0	0	Low-------	0.32	5
Unicorn	11-24	8-18	1.45-1.65	0.60-2.00	0.10-0.20	3.6-5.5	0	Low-------	0.28	
	24-35	5-15	1.35-1.70	0.60-6.00	0.10-0.18	3.6-5.5	0	Low-------	0.24	
	35-51	3-8	1.40-1.70	2.00-20.00	0.05-0.15	3.6-5.5	0	Low-------	0.17	
	51-72	5-27	1.50-1.70	0.60-6.00	0.05-0.24	3.6-5.5	0	Low-------	0.43	
UoB--------------	0-10	7-15	1.30-1.60	0.60-6.00	0.12-0.22	3.6-5.0	0	Low-------	0.32	5
Unicorn	10-20	8-18	1.45-1.65	0.60-2.00	0.10-0.20	3.6-5.5	0	Low-------	0.28	
	20-28	5-15	1.35-1.70	0.60-6.00	0.10-0.18	3.6-5.5	0	Low-------	0.24	
	28-38	3-8	1.40-1.70	2.00-20.00	0.05-0.15	3.6-5.5	0	Low-------	0.17	
	38-72	5-27	1.50-1.70	0.60-6.00	0.05-0.24	3.6-5.5	0	Low-------	0.43	

Table 18.—Physical and Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth (In)	Clay (Pct)	Moist bulk density (g/cc)	Permeability (In/hr)	Available water capacity (In/in)	Soil reaction (pH)	Salinity (mmhos/cm)	Shrink-swell potential	Erosion factors K	Erosion factors T
Ur. Urban land										
UsA:										
Unicorn	0-11	7-15	1.30-1.60	0.60-6.00	0.12-0.22	3.6-5.0	0	Low	0.32	5
	11-24	8-18	1.45-1.65	0.60-2.00	0.10-0.20	3.6-5.5	0	Low	0.28	
	24-35	5-15	1.35-1.70	0.60-6.00	0.10-0.18	3.6-5.5	0	Low	0.24	
	35-51	3-8	1.40-1.70	2.00-20.00	0.05-0.15	3.6-5.5	0	Low	0.17	
	51-72	5-27	1.50-1.70	0.60-6.00	0.05-0.24	3.6-5.5	0	Low	0.43	
Sassafras	0-10	3-12	1.00-1.45	0.60-2.00	0.12-0.20	3.6-5.5	0	Low	0.28	5
	10-50	18-27	1.40-1.65	0.60-2.00	0.11-0.22	3.6-5.5	0	Low	0.37	
	50-72	3-16	1.40-1.70	0.60-20.00	0.04-0.12	3.6-5.5	0	Low	0.17	
UsB:										
Unicorn	0-10	7-15	1.30-1.60	0.60-6.00	0.12-0.22	3.6-5.0	0	Low	0.32	5
	10-20	8-18	1.45-1.65	0.60-2.00	0.10-0.20	3.6-5.5	0	Low	0.28	
	20-28	5-15	1.35-1.70	0.60-6.00	0.10-0.18	3.6-5.5	0	Low	0.24	
	28-38	3-8	1.40-1.70	2.00-20.00	0.05-0.15	3.6-5.5	0	Low	0.17	
	38-72	5-27	1.50-1.70	0.60-6.00	0.05-0.24	3.6-5.5	0	Low	0.43	
Sassafras	0-10	3-12	1.00-1.45	0.60-2.00	0.12-0.20	3.6-5.5	0	Low	0.28	5
	10-50	18-27	1.40-1.65	0.60-2.00	0.11-0.22	3.6-5.5	0	Low	0.37	
	50-72	3-16	1.40-1.70	0.60-20.00	0.04-0.12	3.6-5.5	0	Low	0.17	
UsC:										
Unicorn	0-10	7-15	1.30-1.60	0.60-6.00	0.12-0.22	3.6-5.0	0	Low	0.32	5
	10-21	8-18	1.45-1.65	0.60-2.00	0.10-0.20	3.6-5.5	0	Low	0.28	
	21-38	5-15	1.35-1.70	0.60-6.00	0.10-0.18	3.6-5.5	0	Low	0.24	
	38-60	3-8	1.40-1.70	2.00-20.00	0.05-0.15	3.6-5.5	0	Low	0.17	
	60-72	5-27	1.50-1.70	0.60-6.00	0.05-0.24	3.6-5.5	0	Low	0.43	
Sassafras	0-6	3-12	1.00-1.45	0.60-2.00	0.12-0.20	3.6-5.5	0	Low	0.28	5
	6-34	18-27	1.40-1.65	0.60-2.00	0.11-0.22	3.6-5.5	0	Low	0.37	
	34-72	3-16	1.40-1.70	0.60-20.00	0.04-0.12	3.6-5.5	0	Low	0.17	
W. Water										
Wh: Whitemarsh	0-12	6-16	1.20-1.70	0.60-2.00	0.18-0.24	3.6-5.5	0	Low	0.49	3
	12-62	16-38	1.50-1.80	0.01-0.20	0.08-0.24	3.6-5.5	0	Low	0.43	
	62-72	0-28	1.60-1.80	0.20-20.00	0.08-0.20	3.6-5.5	0	Low	0.37	

Table 19.—Water Features

(The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth (Ft)	High water table: Kind	High water table: Months
Bp: Bestpitch	D	Frequent	Very brief	Jan-Dec	+1-0	Apparent	Jan-Dec
Ca: Carmichael	C/D	None	---	---	0-1.0	Apparent	Dec-May
Co: Corsica	C/D	None	---	---	+1-0.5	Apparent	Dec-Jun
DhC:							
Downer	B	None	---	---	>6.0	---	---
Hammonton	B	None	---	---	1.5-3.5	Apparent	Jan-Apr
DoB: Downer	B	None	---	---	>6.0	---	---
DOE: Downer	B	None	---	---	>6.0	---	---
DUD:							
Downer	B	None	---	---	>6.0	---	---
Unicorn	B	None	---	---	3.5-6.0	Apparent	Jan-May
Fg: Fallsington	B/D	None	---	---	0-1.0	Apparent	Dec-May
FmA: Fort Mott	A	None	---	---	>6.0	---	---
FmB: Fort Mott	A	None	---	---	>6.0	---	---
GfB:							
Galestown	A	None	---	---	>6.0	---	---
Fort Mott	A	None	---	---	>6.0	---	---
GfC:							
Galestown	A	None	---	---	>6.0	---	---
Fort Mott	A	None	---	---	>6.0	---	---
GrA: Greenwich	B	None	---	---	>6.0	---	---
HnA: Hammonton	B	None	---	---	1.5-3.5	Apparent	Jan-Apr
HnB: Hammonton	B	None	---	---	1.5-3.5	Apparent	Jan-Apr
Ho: Honga	D	Frequent	Very brief	Jan-Dec	+1-0	Apparent	Jan-Dec
Hr: Hurlock	B/D	None	---	---	0-1.0	Apparent	Dec-May

Table 19.—Water Features—Continued

Map symbol and soil name	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth (Ft)	High water table: Kind	High water table: Months
IgA------ Ingleside	B	None------	---	---	3.5-6.0	Apparent	Jan-May
IgB------ Ingleside	B	None------	---	---	3.5-6.0	Apparent	Jan-May
IgC------ Ingleside	B	None------	---	---	3.5-6.0	Apparent	Jan-May
Kn------ Kentuck	B/D	None------	---	---	+1-0.5	Apparent	Dec-Jun
Lo------ Longmarsh	D	Frequent-----	Brief	Jan-Dec	+0.5-1.5	Apparent	Sep-Jun
LZ:							
Longmarsh------	D	Frequent-----	Brief	Jan-Dec	+0.5-1.5	Apparent	Sep-Jun
Zekiah------	D	Frequent-----	Brief	Jan-Dec	0-1.0	Apparent	Sep-Jun
MkA------ Matapeake	B	None------	---	---	>6.0	---	---
MkB------ Matapeake	B	None------	---	---	>6.0	---	---
MkC------ Matapeake	B	None------	---	---	>6.0	---	---
MtA:							
Mattapex------	C	None------	---	---	1.5-3.0	Apparent	Jan-Apr
Butlertown------	C	None------	---	---	2.0-4.0	Perched	Feb-Mar
MtB:							
Mattapex------	C	None------	---	---	1.5-3.0	Apparent	Jan-Apr
Butlertown------	C	None------	---	---	2.0-4.0	Perched	Feb-Mar
MtC------ Mattapex	C	None------	---	---	1.5-3.0	Apparent	Jan-Apr
M-W. Miscellaneous water							
NsA------ Nassawango	B	None------	---	---	3.5-6.0	Apparent	Dec-Apr
NsB------ Nassawango	B	None------	---	---	3.5-6.0	Apparent	Dec-Apr
Ot------ Othello	C/D	None------	---	---	0-1.0	Apparent	Jan-May
PiA------ Pineyneck	B	None------	---	---	1.5-3.0	Apparent	Jan-May
PiB------ Pineyneck	B	None------	---	---	1.5-3.0	Apparent	Jan-May
PiC------ Pineyneck	B	None------	---	---	1.5-3.0	Apparent	Jan-May

Table 19.—Water Features—Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth (Ft)	Kind	Months
Pk------------------------ Puckum	D	Frequent-----	Brief	Jan-Dec	+1-0	Apparent	Jan-Dec
UbB----------------------- Udorthents	B/D	None---------	---	---	>5.0	Apparent	Nov-Mar
UdB:							
Udorthents------------	B/D	None---------	---	---	>5.0	Apparent	Nov-Mar
Sulfaquents.							
UlB----------------------- Udorthents	B/D	None---------	---	---	>5.0	Apparent	Nov-Mar
UoA----------------------- Unicorn	B	None---------	---	---	3.5-6.0	Apparent	Jan-May
UoB----------------------- Unicorn	B	None---------	---	---	3.5-6.0	Apparent	Jan-May
Ur. Urban land							
UsA:							
Unicorn---------------	B	None---------	---	---	3.5-6.0	Apparent	Jan-May
Sassafras-------------	B	None---------	---	---	>6.0	---	---
UsB:							
Unicorn---------------	B	None---------	---	---	3.5-6.0	Apparent	Jan-May
Sassafras-------------	B	None---------	---	---	>6.0	---	---
UsC:							
Unicorn---------------	B	None---------	---	---	3.5-6.0	Apparent	Jan-May
Sassafras-------------	B	None---------	---	---	>6.0	---	---
W. Water							
Wh------------------------ Whitemarsh	C/D	None---------	---	---	0-1.0	Apparent	Jan-May

Table 20.—Soil Features

(The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Subsidence		Potential frost action	Risk of corrosion	
	Initial	Total		Uncoated steel	Concrete
	In	In			
Bp------------------- Bestpitch	15-25	25-35	Low---------	High--------	High.
Ca------------------- Carmichael	0	---	High--------	High--------	High.
Co------------------- Corsica	0	---	Moderate----	High--------	High.
DhC:					
Downer--------------	0	---	Low---------	Moderate----	High.
Hammonton-----------	0	---	Moderate----	Moderate----	High.
DoB------------------ Downer	0	---	Low---------	Moderate----	High.
DOE------------------ Downer	0	---	Low---------	Moderate----	High.
DuD:					
Downer--------------	0	---	Low---------	Moderate----	High.
Unicorn-------------	0	---	Moderate----	Moderate----	High.
Fg------------------- Fallsington	0	---	Moderate----	High--------	High.
FmA------------------ Fort Mott	0	---	Moderate----	Moderate----	High.
FmB------------------ Fort Mott	0	---	Moderate----	Moderate----	High.
GfB:					
Galestown-----------	0	---	Low---------	Low---------	High.
Fort Mott-----------	0	---	Moderate----	Moderate----	High.
GfC:					
Galestown-----------	0	---	Low---------	Low---------	High.
Fort Mott-----------	0	---	Moderate----	Moderate----	High.
GrA------------------ Greenwich	0	---	Moderate----	Moderate----	High.
HnA------------------ Hammonton	0	---	Moderate----	Moderate----	High.
HnB------------------ Hammonton	0	---	Moderate----	Moderate----	High.
Ho------------------- Honga	10-20	10-20	Low---------	High--------	High.
Hr------------------- Hurlock	0	---	Moderate----	High--------	High.

Table 20.—Soil Features—Continued

Map symbol and soil name	Subsidence		Potential frost action	Risk of corrosion	
	Initial	Total		Uncoated steel	Concrete
	In	In			
IgA: Ingleside	0	---	Low	Moderate	High.
IgB: Ingleside	0	---	Low	Moderate	High.
IgC: Ingleside	0	---	Low	Moderate	High.
Kn: Kentuck	0	---	Moderate	High	High.
Lo: Longmarsh	0	---	High	High	High.
LZ:					
Longmarsh	0	---	High	High	High.
Zekiah	0	---	Moderate	High	High.
MkA: Matapeake	0	---	Moderate	Moderate	High.
MkB: Matapeake	0	---	Moderate	Moderate	High.
MkC: Matapeake	0	---	Moderate	Moderate	High.
MtA:					
Mattapex	0	---	Moderate	High	High.
Butlertown	0	---	High	Moderate	High.
MtB:					
Mattapex	0	---	Moderate	High	High.
Butlertown	0	---	High	Moderate	High.
MtC: Mattapex	0	---	Moderate	High	High.
M-W. Miscellaneous water					
NsA: Nassawango	0	---	Moderate	Moderate	High.
NsB: Nassawango	0	---	Moderate	Moderate	High.
Ot: Othello	0	---	Moderate	High	High.
PiA: Pineyneck	0	---	Moderate	Moderate	High.
PiB: Pineyneck	0	---	Moderate	Moderate	High.

Table 20.—Soil Features—Continued

Map symbol and soil name	Subsidence		Potential frost action	Risk of corrosion	
	Initial	Total		Uncoated steel	Concrete
	In	In			
PiC: Pineyneck	0	---	Moderate	Moderate	High.
Pk: Puckum	10-20	20-40	Low	High	High.
UbB: Udorthents	0	---	Moderate	Moderate	Moderate.
UdB:					
Udorthents	0	---	Moderate	High	High.
Sulfaquents.					
UlB: Udorthents	0	---	Moderate	High	High.
UoA: Unicorn	0	---	Moderate	Moderate	High.
UoB: Unicorn	0	---	Moderate	Moderate	High.
Ur. Urban land					
UsA:					
Unicorn	0	---	Moderate	Moderate	High.
Sassafras	0	---	Moderate	Low	High.
UsB:					
Unicorn	0	---	Moderate	Moderate	High.
Sassafras	0	---	Moderate	Low	High.
UsC:					
Unicorn	0	---	Moderate	Moderate	High.
Sassafras	0	---	Moderate	Low	High.
W. Water					
Wh: Whitemarsh	0	---	High	High	High.

Table 21.—Physical Analyses of Selected Soils

(TR means trace. Dashes indicate that data was not determined)

Soil series and sample number	Depth	Horizon	Particle-size distribution: Sand: Very coarse (2-1 mm)	Coarse (1-0.5 mm)	Medium (0.5-0.25 mm)	Fine (0.25-0.1 mm)	Very fine (0.1-0.05 mm)	Total (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	Coarse frag- ments >2 mm	Ratio to total clay cation-exchange capacity	Bul densi (fie mois
	In		Pct	Pct	Pct	Pct	Pct	Pct	Pct	Pct	Pct/wt		g/c
Butlertown 1, 2:													
S92MD-035-024-1	4-10	E	0.1	0.3	1.2	4.4	6.5	12.5	75.9	11.6	---	0.47	---
-2	10-16	BE	TR	0.2	0.8	2.3	7.3	10.6	74.2	15.2	---	0.36	---
-3	16-21	Bt1	TR	0.1	0.6	1.8	7.4	9.9	71.5	18.6	---	0.38	---
-4	21-29	Bt2	---	0.1	0.4	1.8	7.4	9.7	73.1	17.2	---	0.48	1.6
-5	29-33	Btx	0.1	0.7	3.3	15.6	5.5	25.2	55.8	19.0	---	0.59	1.6
-6	33-48	2BCx	---	0.5	3.9	24.3	7.5	36.2	49.2	14.6	---	0.64	1.8
-7	48-58	2C1	1.0	2.4	14.0	58.5	10.5	86.4	10.0	3.6	2	0.61	1.6
-8	58-64	2C2	0.5	1.0	15.9	57.3	10.7	85.4	6.2	8.4	TR	0.54	---
-9	64-74	2C3	0.5	1.8	24.7	63.2	4.7	94.9	5.1	---	2	---	---
Carmichael 1, 3:													
S94MD-035-062-1	8-15	BEg	1.5	6.2	11.0	12.3	5.6	38.6	45.9	15.5	0.3	---	---
-2	15-19	Btg1	1.2	7.5	9.8	12.0	5.9	36.3	42.6	21.1	0.2	---	---
-3	19-25	Btg2	0.8	5.4	7.9	10.3	6.7	31.1	52.9	16.0	0.4	---	---
-4	25-33	Btg3	0.8	4.0	6.5	10.3	8.0	29.4	57.1	13.5	0.7	---	---
Ingleside 1, 2:													
S92MD-035-026-1	0-10	Ap	1.3	15.8	44.2	9.3	1.9	72.5	21.5	6.0	---	0.50	1.3
-2	10-15	E	3.0	19.7	44.6	8.8	1.5	77.6	17.3	5.1	---	0.35	1.5
-3	15-25	Bt1	1.6	15.8	42.8	9.7	1.7	71.6	16.3	12.1	---	0.36	1.7
-4	25-38	Bt2	3.4	24.6	43.4	7.1	1.2	79.7	12.4	7.9	---	0.34	1.5
-5	38-43	BC	1.6	17.6	48.5	10.1	1.8	79.6	13.8	6.6	---	0.35	---
-6	43-59	C/B	1.7	22.7	51.6	14.0	2.7	92.7	6.2	1.1	---	0.91	---
-7	59-72	2C1	5.6	9.2	21.5	9.9	6.2	52.4	40.1	7.5	7	0.39	1.8

See footnotes at end of table.

Table 21.--Physical Analyses of Selected Soils--Continued

Soil series and sample number	Depth	Horizon	Particle-size distribution: Sand: Very coarse (2-1 mm)	Coarse (1-0.5 mm)	Medium (0.5-0.25 mm)	Fine (0.25-0.1 mm)	Very fine (0.1-0.05 mm)	Total (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	Coarse fragments >2 mm	Ratio to total clay cation-exchange capacity	Bul densi (fie mois
	In		Pct	Pct	Pct	Pct	Pct	Pct	Pct	Pct	Pct/wt		g/c
Matapeake 2, 4:													
S92MD-035-028-1	0-5	A	0.2	1.8	5.3	2.6	2.2	12.1	73.3	14.6	---	0.70	---
-2	5-10	E	0.2	1.6	5.3	2.5	2.9	12.5	72.6	14.9	---	0.29	---
-3	10-15	BE	0.2	1.5	4.8	2.4	3.5	12.4	69.0	18.6	---	0.23	---
-4	15-31	Bt1	0.2	1.2	3.3	1.7	2.3	8.7	63.3	28.0	---	0.29	1.5
-5	31-37	Bt2	0.4	1.4	3.4	1.8	2.8	9.8	63.6	26.6	---	0.30	1.5
-6	37-45	B	0.1	1.1	3.2	1.5	3.0	8.9	70.5	20.6	---	0.35	1.6
-7	45-57	BC	0.3	4.2	12.7	8.2	3.0	28.4	51.2	20.4	---	0.37	1.7
-8	57-72	2C	2.1	9.1	24.0	14.8	3.4	53.4	28.7	17.9	TR	0.30	1.7
Pineyneck 1, 3:													
S94MD-035-072-1	9-14	E	0.3	1.6	3.7	13.0	14.0	32.6	55.5	11.9	0.0	---	---
-2	14-20	Bt1	0.2	1.3	3.0	11.8	13.2	29.4	54.2	16.4	0.0	---	---
-3	20-27	Bt2	0.6	1.0	3.7	19.7	20.1	45.1	41.5	13.4	0.0	---	---
Unicorn 1, 3:													
S94MD-035-071-1	11-18	Bt/E	1.3	9.2	9.2	8.0	3.1	30.9	51.5	17.6	0.2	---	---
-2	18-24	Bt1	3.4	14.0	13.5	12.2	3.7	46.8	35.2	18.0	1.5	---	---
-3	24-35	2Bt2	5.5	22.1	21.2	21.9	5.8	76.6	12.6	10.8	3.4	---	---
Whitemarsh 1, 2:													
S92MD-035-025-1	4-12	Eg	0.3	0.8	2.0	1.8	2.2	7.1	81.0	11.9	TR	0.32	1.6
-2	12-24	Btg1	TR	0.2	0.6	0.7	1.9	3.4	60.2	36.4	---	0.48	1.5
-3	24-37	Btg2	TR	0.3	0.6	0.6	1.8	3.3	73.7	23.0	---	0.50	1.6
-4	37-55	Btg3	0.1	0.4	1.3	2.0	5.3	9.1	69.2	21.7	---	0.47	1.5
-5	55-62	BCg	---	0.4	1.4	1.2	4.0	7.0	76.4	16.6	---	0.46	---
-6	62-72	2Cg	0.4	3.6	10.3	6.3	2.2	22.8	52.6	24.6	2	0.41	---

[1] Pedon is typical for the series. See text for description of location.

[2] Samples processed at Natural Resources Conservation Service, Soil Survey Laboratory, National Soil Survey Nebraska.

[3] Samples processed at Pedology Research Laboratory, University of Maryland.

[4] Pedon is not typical for the series. Location: near Centreville, 1 mile east of Route 213, about 0.3 mil Whitemarsh Road, in woods; lat. 39 degrees 4 minutes 1.7 seconds N. and long. 76 degrees 1 minute 59.1 seconds W

Table 22.—Chemical Analyses of Selected Soils

(Samples processed at Natural Resources Conservation Service, Soil Survey Laboratory, National Soil Survey Center, Lincoln, Nebraska. TR means trace. Dashes indicate that data was not determined)

Soil series and sample number	Depth	Horizon	Extractable bases: Ca	Extractable bases: Mg	Extractable bases: Na	Extractable bases: K	Extractable bases: Sum	Cation-exchange capacity (ammonium acetate)	Base saturation[1]	Organic carbon	pH (H_2O)
	In		Milliequivalents/100 grams						Pct	Pct	
Butlertown [2]:											
S92MD-035-024-1	4-10	E	0.1	TR	0.2	---	0.3	5.4	3	1.13	4.4
-2	10-16	BE	TR	TR	0.2	TR	0.2	5.5	2	0.36	4.5
-3	16-21	Bt1	0.1	0.5	1.6	---	2.2	7.1	24	0.16	4.7
-4	21-29	Bt2	TR	2.4	0.3	TR	2.7	8.3	25	0.09	5.0
-5	29-33	Btx	TR	5.1	0.7	---	5.8	11.3	39	0.15	5.1
-6	33-48	2BCx	0.1	4.4	0.7	0.1	5.3	9.3	38	0.05	5.3
-7	48-58	2C1	0.1	0.9	0.2	---	1.2	2.2	27	0.06	5.3
-8	58-64	2C2	0.1	1.7	0.2	---	2.0	4.5	31	0.03	5.3
-9	64-74	2C3	TR	0.4	0.5	---	0.9	1.2	33	0.04	5.1
Ingleside [2]:											
S92MD-035-026-1	0-10	Ap	1.3	0.4	---	0.1	1.8	3.0	43	0.69	4.7
-2	10-15	E	1.4	0.3	---	TR	1.7	1.8	77	0.15	6.2
-3	15-25	Bt1	2.9	0.8	---	---	3.7	4.4	57	0.23	6.6
-4	25-38	Bt2	1.9	0.7	---	0.1	2.7	2.7	63	0.14	6.7
-5	38-43	BC	1.5	0.6	1.1	---	3.2	2.3	82	0.07	6.6
-6	43-59	C/B	0.7	0.3	---	0.1	1.1	1.0	55	0.03	6.6
-7	59-72	2C1	2.3	0.7	---	TR	3.0	2.9	65	0.05	6.8
Matapeake [3]:											
S92MD-035-028-1	0-5	A	0.4	0.5	---	0.1	1.0	10.2	7	2.95	4.5
-2	5-10	E	TR	0.2	---	0.2	0.4	4.3	7	0.59	4.6
-3	10-15	BE	---	0.3	---	0.1	0.4	4.3	7	0.22	4.6
-4	15-31	Bt1	0.4	2.0	---	TR	2.4	8.2	25	0.15	5.0
-5	31-37	Bt2	0.3	2.6	---	0.2	3.1	7.9	25	0.12	5.1
-6	37-45	B	0.6	2.6	0.2	0.2	3.6	7.2	40	0.08	5.3
-7	45-57	BC	0.8	2.4	0.3	0.2	3.7	7.6	41	0.07	5.3
-8	57-72	2C	0.6	1.8	0.2	0.2	2.8	5.3	41	0.04	5.3
Whitemarsh [2]:											
S92MD-035-025-1	4-12	Eg	0.1	0.1	0.3	---	0.5	3.8	10	0.46	4.5
-2	12-24	Btg1	0.1	4.3	1.6	TR	6.0	17.5	28	0.25	5.1
-3	24-37	Btg2	0.1	3.3	2.1	0.1	5.6	11.6	40	0.10	4.9
-4	37-55	Btg3	0.1	3.2	3.9	0.1	7.3	10.2	58	0.02	5.1
-5	55-62	BCg	0.1	2.7	3.3	0.1	6.2	8.0	60	0.03	5.1
-6	62-72	2Cg	0.2	3.2	2.9	0.3	6.6	10.2	49	0.05	5.1

[1] Soils that exceed 35 percent base saturation due to current or past agricultural liming are considered cultural Alfisols.

[2] Pedon is typical for the series. See text for description of location.

[3] Pedon is not typical for the series. Location: near Centreville, 1 mile east of Route 213, about 0.3 mile south of Whitemarsh Road, in woods; lat. 39 degrees 4 minutes 1.7 seconds N. and long. 76 degrees 1 minute 59.1 seconds W.

Table 23.—Engineering Index Test Data

(Samples processed at Natural Resources Conservation Service, Soil Survey Laboratory, National Soil Survey Center, Lincoln, Nebraska. Dashes indicate that data was not determined)

Soil series and sample number	Depth (In)	Horizon	Percentage passing sieve-- No. 4	No. 10	No. 40	No. 200	20 microns	5 microns	2 microns
Butlertown [1]:									
S92MD-035-024-1	4-10	E	100	100	99	91	51	27	12
-2	10-16	BE	100	100	100	94	52	30	15
-3	16-21	Bt1	100	100	100	94	54	33	19
-4	21-29	Bt2	100	100	100	94	50	30	17
-5	29-33	Btx	100	100	98	78	49	31	19
-6	33-48	2BCx	100	100	99	68	41	25	15
-7	48-58	2C1	99	98	91	19	8	5	4
-8	58-64	2C2	100	100	95	21	12	10	8
-9	64-74	2C3	---	---	---	---	---	---	---
Ingleside [1]:									
S92MD-035-026-1	0-10	Ap	100	100	72	29	17	10	6
-2	10-15	E	100	100	66	23	14	9	5
-3	15-25	Bt1	100	100	72	29	20	15	12
-4	25-38	Bt2	100	100	61	21	15	11	8
-5	38-43	BC	100	100	69	21	12	9	7
-6	43-59	C/B	100	100	63	9	4	2	1
-7	59-72	2C1	98	93	74	48	23	13	7
Matapeake [2]:									
S92MD-035-028-1	0-5	A	100	100	97	89	56	31	15
-2	5-10	E	100	100	97	89	55	31	15
-3	10-15	BE	100	100	97	90	57	34	19
-4	15-31	Bt1	100	100	98	93	62	42	28
-5	31-37	Bt2	100	100	97	92	58	39	27
-6	37-45	B	100	100	98	93	52	33	21
-7	45-57	BC	100	100	92	73	49	32	20
-8	57-72	2C	100	100	83	49	33	24	18
Whitemarsh [1]:									
S92MD-035-025-1	4-12	Eg	100	100	98	94	59	31	12
-2	12-24	Btg1	100	100	100	98	71	50	36
-3	24-37	Btg2	100	100	100	98	61	38	23
-4	37-55	Btg3	100	100	99	94	53	34	22
-5	55-62	BCg	100	100	99	95	49	29	17
-6	62-72	2Cg	99	98	92	77	56	37	24

[1] Pedon is typical for the series. See text for description of location.

[2] Pedon is not typical for the series. Location: near Centreville, 1 mile east of Route 213, about 0.3 mile south of Whitemarsh Road, in woods; lat. 39 degrees 4 minutes 1.7 seconds N. and long. 76 degrees 1 minute 59.1 seconds W.

Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at (800) 457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

Nondiscrimination Statement

Nondiscrimination Policy

The U.S. Department of Agriculture (USDA) prohibits discrimination against its customers, employees, and applicants for employment on the basis of race, color, national origin, age, disability, sex, gender identity, religion, reprisal, and where applicable, political beliefs, marital status, familial or parental status, sexual orientation, whether all or part of an individual's income is derived from any public assistance program, or protected genetic information. The Department prohibits discrimination in employment or in any program or activity conducted or funded by the Department. (Not all prohibited bases apply to all programs and/or employment activities.)

To File an Employment Complaint

If you wish to file an employment complaint, you must contact your agency's EEO Counselor (http://directives.sc.egov.usda.gov/33081.wba) within 45 days of the date of the alleged discriminatory act, event, or personnel action. Additional information can be found online at http://www.ascr.usda.gov/complaint_filing_file.html.

To File a Program Complaint

If you wish to file a Civil Rights program complaint of discrimination, complete the USDA Program Discrimination Complaint Form, found online at http://www.ascr.usda.gov/complaint_filing_cust.html or at any USDA office, or call (866) 632-9992 to request the form. You may also write a letter containing all of the information requested in the form. Send your completed complaint form or letter by mail to U.S. Department of Agriculture; Director, Office of Adjudication; 1400 Independence Avenue, S.W.; Washington, D.C. 20250-9419; by fax to (202) 690-7442; or by email to program.intake@usda.gov.

Persons with Disabilities

If you are deaf, are hard of hearing, or have speech disabilities and you wish to file either an EEO or program complaint, please contact USDA through the Federal Relay Service at (800) 877-8339 or (800) 845-6136 (in Spanish).

If you have other disabilities and wish to file a program complaint, please see the contact information above. If you require alternative means of communication for

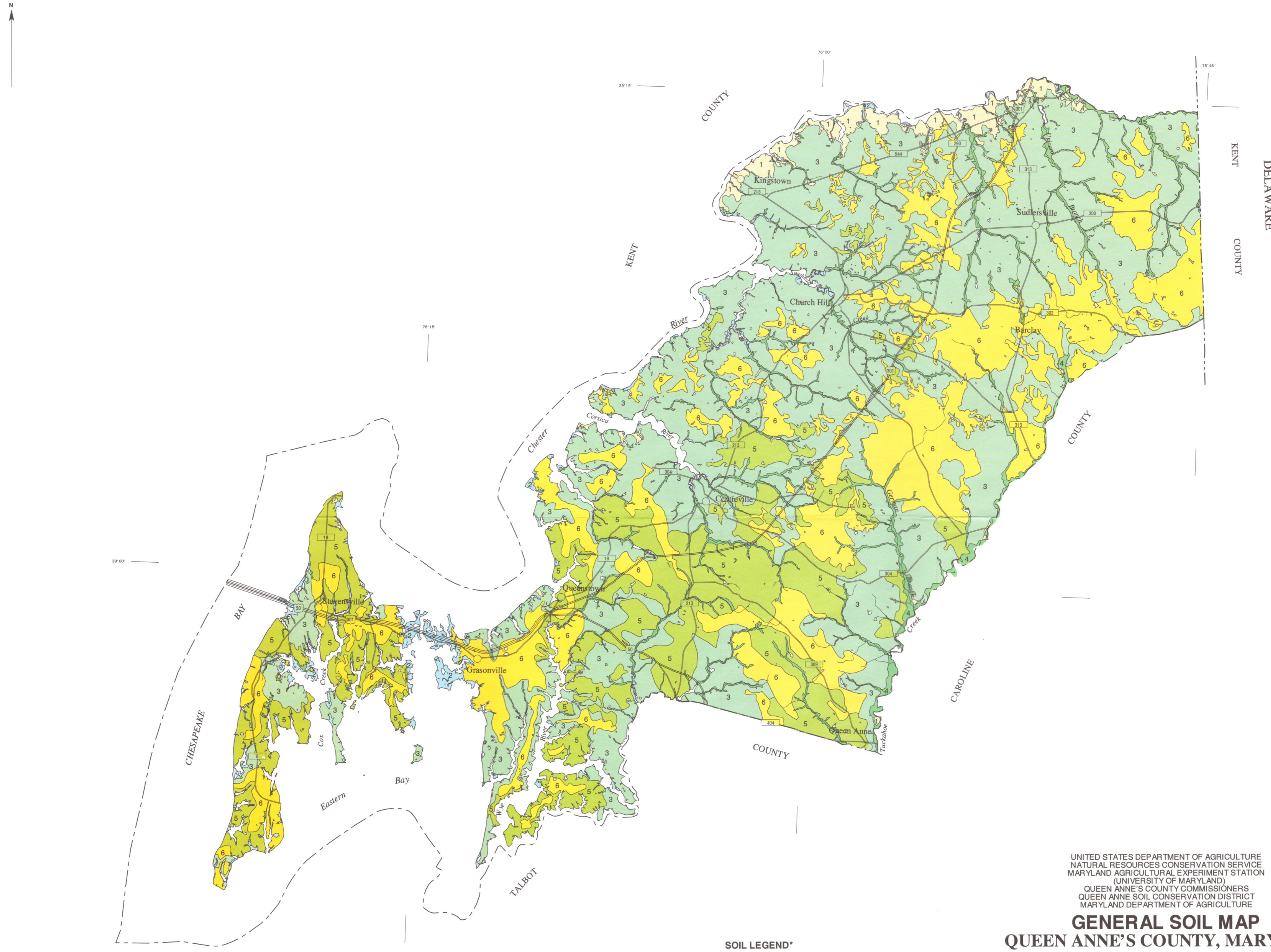
program information (e.g., Braille, large print, audiotape, etc.), please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

Supplemental Nutrition Assistance Program

For additional information dealing with Supplemental Nutrition Assistance Program (SNAP) issues, call either the USDA SNAP Hotline Number at (800) 221-5689, which is also in Spanish, or the State Information/Hotline Numbers (http://directives.sc.egov.usda.gov/33085.wba).

All Other Inquiries

For information not pertaining to civil rights, please refer to the listing of the USDA Agencies and Offices (http://directives.sc.egov.usda.gov/33086.wba).



UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
MARYLAND AGRICULTURAL EXPERIMENT STATION
(UNIVERSITY OF MARYLAND)
QUEEN ANNE'S COUNTY COMMISSIONERS
QUEEN ANNE SOIL CONSERVATION DISTRICT
MARYLAND DEPARTMENT OF AGRICULTURE

GENERAL SOIL MAP
QUEEN ANNE'S COUNTY, MARYLAND

Scale 1:126720

1 0 1 2 3
MILES

1 0 1 2 3 4 5 6
KILOMETERS

SOIL LEGEND*

1	Fort Mott - Galestown
2	Honga - Bestpitch
3	Ingleside - Pineyneck - Unicorn
4	Longmarsh - Zekiah
5	Matapeake - Mattapex - Nassawango
6	Whitemarsh - Hurlock - Carmichael

*The units on this legend are described in the text under the heading "General Soil Map Units."

Compiled 1995

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

INDEX TO MAP SHEETS
QUEEN ANNE'S COUNTY, MARYLAND

Scale 1:126720

MILES

KILOMETERS

SOIL LEGEND

The publication symbol consists of a combination of letters. The first letter is the initial letter of the map unit name. The second letter is used to separate map units that have names beginning with the same first letter. This letter is usually lowercase. It is capital for broadly defined map units, such as undifferentiated groups. The third letter, if present, is a capital A, B, C, D, or E and indicates the slope class of the map unit. All higher categories are designated with a capital letter for the first letter, a lowercase letter for the second letter, and a capital letter for the third letter. Symbols without a slope letter are used for nearly level map units.

SYMBOL	NAME
Bp	Bestpitch peat
Ca	Carmichael loam
Co	Corsica mucky loam
DhC	Downer-Hammonton sandy loams, 5 to 10 percent slopes
DoB	Downer sandy loam, 2 to 5 percent slopes
DOE	Downer soils, 15 to 30 percent slopes
DUD	Downer and Unicorn soils, 10 to 15 percent slopes
Fg	Fallsington loam
FmA	Fort Mott loamy sand, 0 to 2 percent slopes
FmB	Fort Mott loamy sand, 2 to 5 percent slopes
GfB	Galestown-Fort Mott loamy sands, 0 to 5 percent slopes
GfC	Galestown-Fort Mott loamy sands, 5 to 10 percent slopes
GrA	Greenwich loam, 0 to 2 percent slopes
HnA	Hammonton sandy loam, 0 to 2 percent slopes
HnB	Hammonton sandy loam, 2 to 5 percent slopes
Ho	Honga peat
Hr	Hurlock sandy loam
IgA	Ingleside sandy loam, 0 to 2 percent slopes
IgB	Ingleside sandy loam, 2 to 5 percent slopes
IgC	Ingleside sandy loam, 5 to 10 percent slopes
Kn	Kentuck mucky silt loam
Lo	Longmarsh mucky loam, 0 to 1 percent slopes
LZ	Longmarsh and Zekiah soils, 0 to 2 percent slopes
MkA	Matapeake silt loam, 0 to 2 percent slopes
MkB	Matapeake silt loam, 2 to 5 percent slopes
MkC	Matapeake silt loam, 5 to 10 percent slopes
MtA	Mattapex-Butlertown silt loams, 0 to 2 percent slopes
MtB	Mattapex-Butlertown silt loams, 2 to 5 percent slopes
MtC	Mattapex silt loam, 5 to 10 percent slopes
MW	Miscellaneous water
NsA	Nassawango silt loam, 0 to 2 percent slopes
NsB	Nassawango silt loam, 2 to 5 percent slopes
Ot	Othello silt loam
PiA	Pineyneck silt loam, 0 to 2 percent slopes
PiB	Pineyneck silt loam, 2 to 5 percent slopes
PiC	Pineyneck silt loam, 5 to 10 percent slopes
Pk	Puckum mucky peat
UbB	Udorthents, borrow area, 0 to 5 percent slopes
UdB	Udorthents and Sulfaquents, dredge spoil, 0 to 5 percent slopes
UlB	Udorthents, landfill, 0 to 5 percent slopes
UoA	Unicorn silt loam, 0 to 2 percent slopes
UoB	Unicorn silt loam, 2 to 5 percent slopes
Ur	Urban land
UsA	Unicorn-Sassafras loams, 0 to 2 percent slopes
UsB	Unicorn-Sassafras loams, 2 to 5 percent slopes
UsC	Unicorn-Sassafras loams, 5 to 10 percent slopes
Wh	Whitemarsh silt loam
W	Water

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool

ROADS

- Divided (median shown if scale permits)
- Other roads

ROAD EMBLEM & DESIGNATIONS

- Federal — 287
- State — 52

RAILROAD

DAMS

- Medium or Small (Named where applicable) — water

PITS

- Gravel pit

MISCELLANEOUS CULTURAL FEATURES

- Church (in rural areas)
- School

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Canals or ditches
  - Double-line (label) — CANAL

LAKES, PONDS AND RESERVOIRS

- Perennial water

MISCELLANEOUS WATER FEATURES

- Wet spot
- Miscellaneous Water (manmade-industrial or sanitary) — MW

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — Bp Hr

ESCARPMENTS

- Other than bedrock (points down slope)

SHORT STEEP SLOPE

MISCELLANEOUS

- Gravelly spot
- Sandy spot
- Cut and fill

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

QUEEN ANNE'S COUNTY, MARYLAND
GALENA SE QUADRANGLE
SHEET NUMBER 1 OF 47

75°56'15" 75°52'30"
39°18'45"

39°15'00"
420 000mE 421 422 423 424

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

1	2	3
4		5
6	7	8

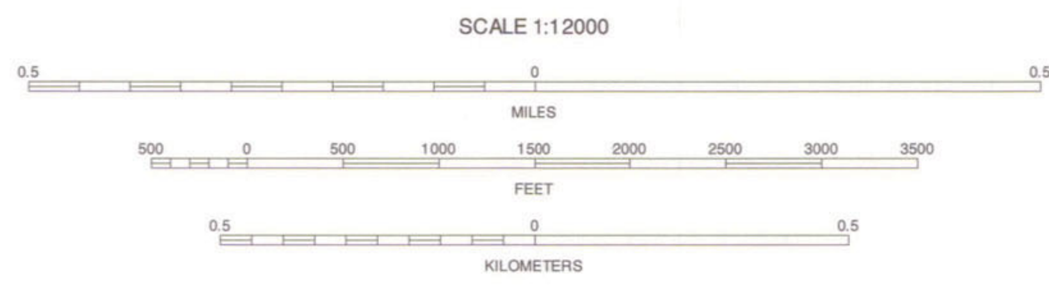
1 GALENA NW
2 GALENA NE
3 MILLINGTON NW
4 GALENA SW
5 MILLINGTON SW
6 CHURCH HILL NW
7 CHURCH HILL NE
8 SUDLERSVILLE NW

INDEX TO ADJOINING 3.75 MAPS

GALENA SE, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 1 OF 47

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



1	2	3
4		5
6	7	8

1 CHESTERTOWN NW
2 CHESTERTOWN NE
3 CHURCH HILL NW
4 CHESTERTOWN SW
5 CHURCH HILL SW
6 CENTREVILLE NW
7 CENTREVILLE NE
8 PRICE NW

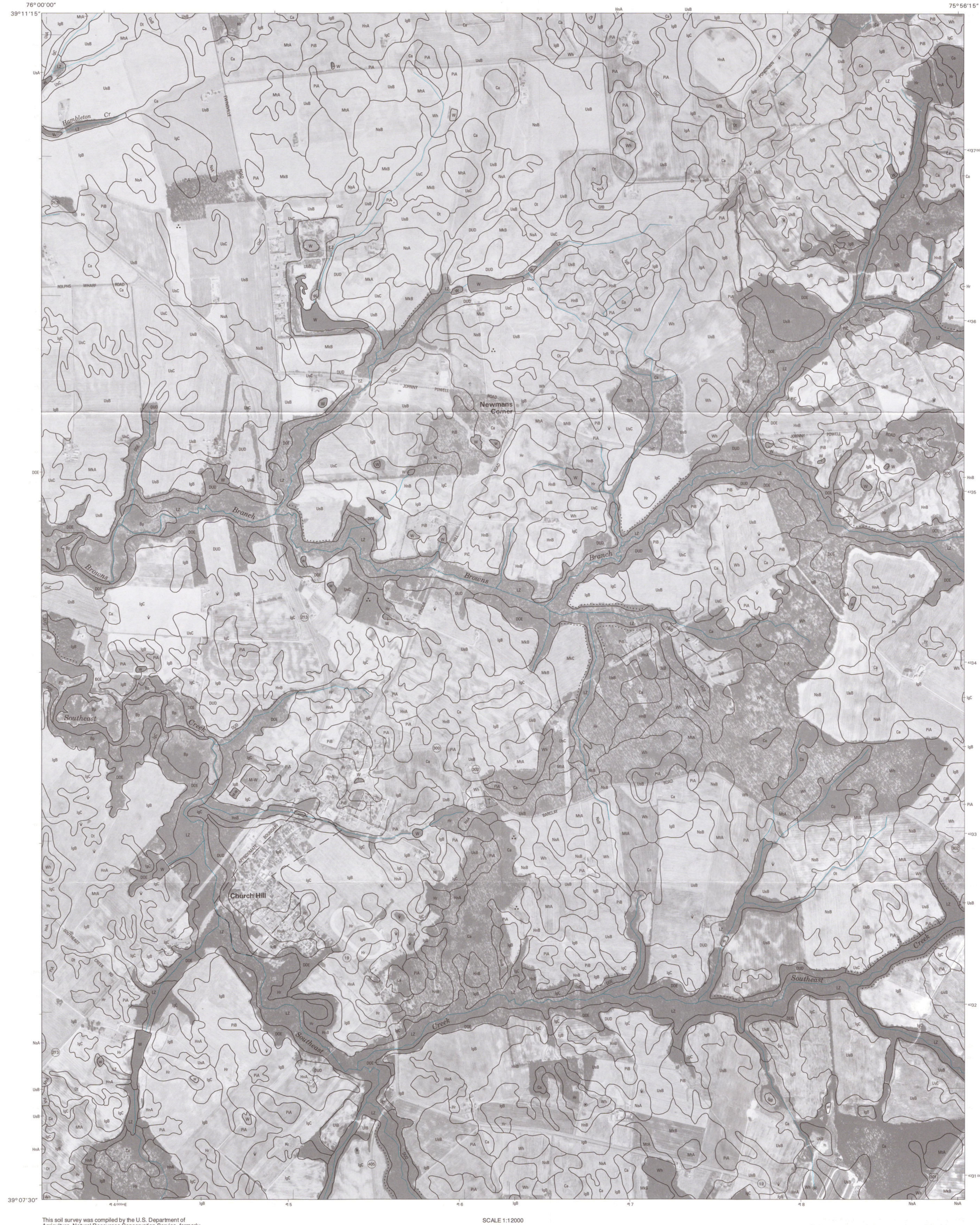
INDEX TO ADJOINING 3.75 MAPS

CHESTERTOWN SE, MARYLAND

3.75 MINUTE SERIES
SHEET NUMBER 10 OF 47

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

QUEEN ANNE'S COUNTY, MARYLAND
CHURCH HILL SW QUADRANGLE
SHEET NUMBER 11 OF 47

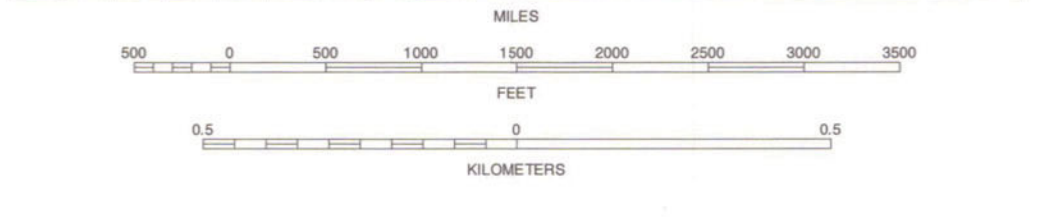


This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

QUARTER QUADRANGLE LOCATION

SCALE 1:12000



1	2	3
4		5
6	7	8

1 CHESTERTOWN NE
2 CHURCH HILL NW
3 CHURCH HILL NE
4 CHESTERTOWN SE
5 CHURCH HILL SE
6 CENTREVILLE NE
7 PRICE NW
8 PRICE NE

INDEX TO ADJOINING 3.75 MAPS

CHURCH HILL SW, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 11 OF 47

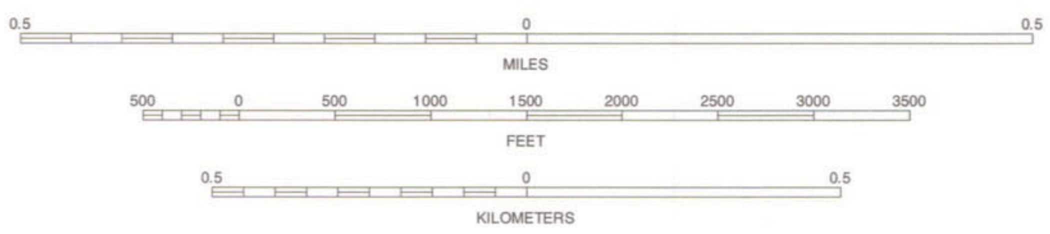
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

QUEEN ANNE'S COUNTY, MARYLAND
CHURCH HILL SE QUADRANGLE
SHEET NUMBER 12 OF 47

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

SCALE 1:12000



1 CHURCH HILL NW
2 CHURCH HILL NE
3 SUDLERSVILLE NW
4 CHURCH HILL SW
5 SUDLERSVILLE SW
6 PRICE NW
7 PRICE NE
8 GOLDSBORO NW

INDEX TO ADJOINING 3.75 MAPS

CHURCH HILL SE, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 12 OF 47

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

1 CHURCH HILL NE
2 SUDLERSVILLE NW
3 SUDLERSVILLE NE
4 CHURCH HILL SE
5 SUDLERSVILLE SE
6 PRICE NE
7 GOLDSBORO NW
8 GOLDSBORO NE

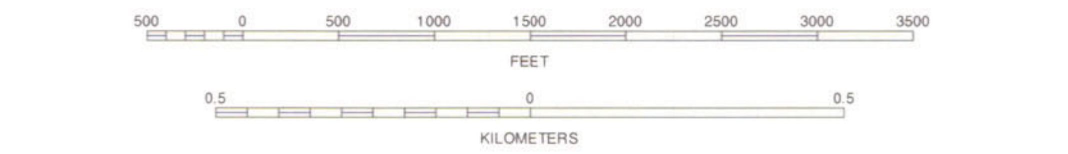
SUDLERSVILLE SW, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 13 OF 47

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

QUARTER QUADRANGLE LOCATION

SCALE 1:12000



1	2	3
4		5
6	7	8

1 SUDLERSVILLE NW
2 SUDLERSVILLE NE
3 KENTON NW
4 SUDLERSVILLE SW
5 KENTON SW
6 GOLDSBORO NW
7 GOLDSBORO NE
8 MARYDEL NW

INDEX TO ADJOINING 3.75 MAPS

SUDLERSVILLE SE, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 14 OF 47

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

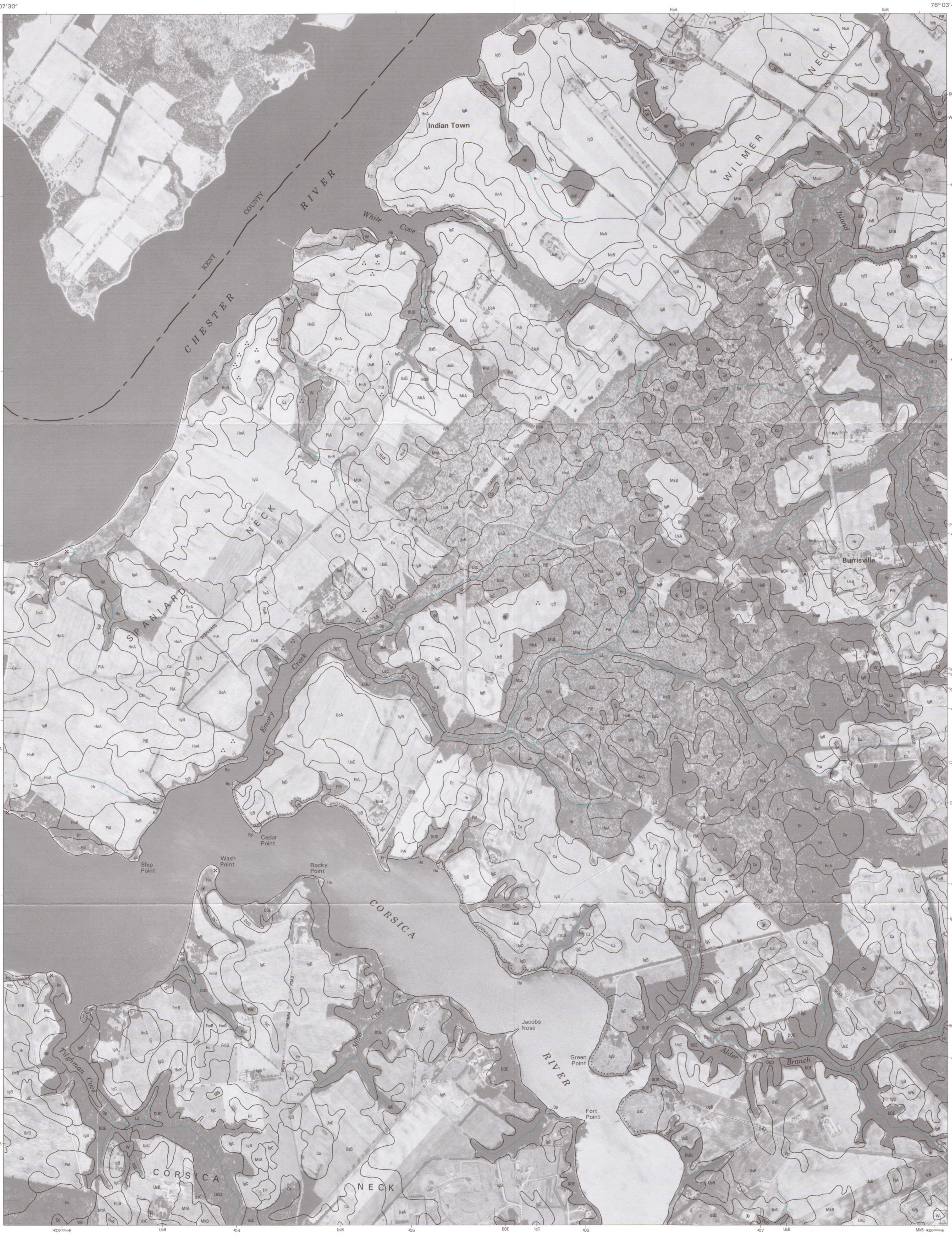
0.5 0 0.5
KILOMETERS

1	2	3
4		5
6	7	8

1 ROCK HALL SW
2 ROCK HALL SE
3 CHESTERTOWN SW
4 LANGFORD CREEK NW
5 CENTREVILLE NW
6 LANGFORD CREEK SW
7 LANGFORD CREEK SE
8 CENTREVILLE SW

INDEX TO ADJOINING 3.75 MAPS

LANGFORD CREEK NE, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 15 OF 47

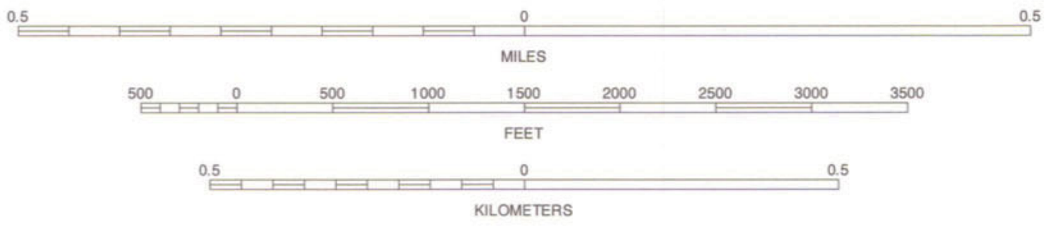


This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

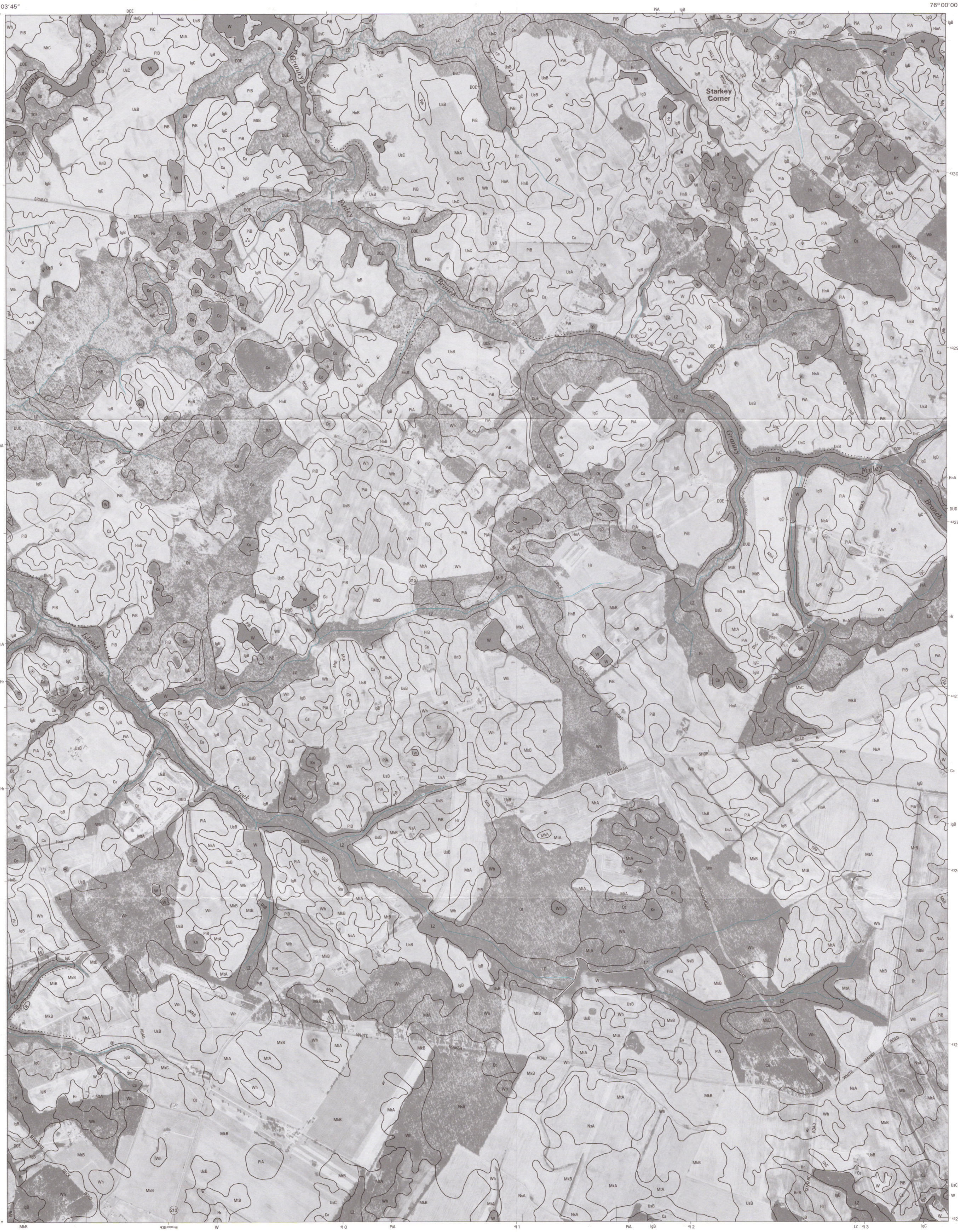


1	2	3	1 ROCK HALL SE
			2 CHESTERTOWN SW
4		5	3 CHESTERTOWN SE
			4 LANGFORD CREEK NE
6	7	8	5 CENTREVILLE NE
			6 LANGFORD CREEK SE
			7 CENTREVILLE SW
			8 CENTREVILLE SE

INDEX TO ADJOINING 3.75 MAPS

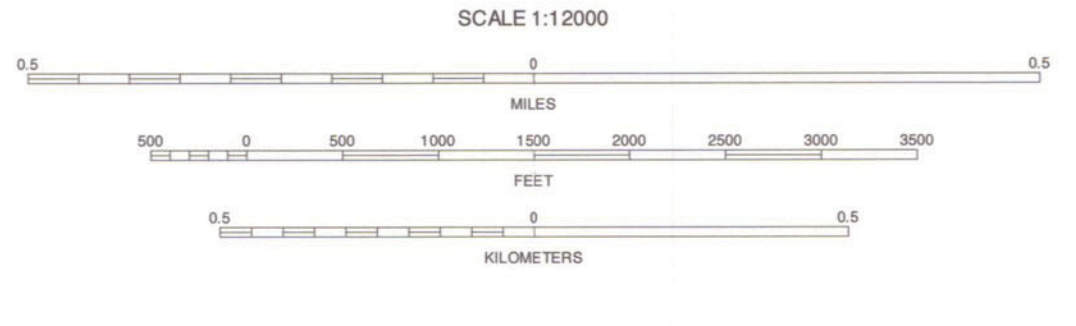
CENTREVILLE NW, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 16 OF 47

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



1	2	3	
4		5	
6	7	8	

1 CHESTERTOWN SW
2 CHESTERTOWN SE
3 CHURCH HILL SW
4 CENTREVILLE NW
5 PRICE NW
6 CENTREVILLE SW
7 CENTREVILLE SE
8 PRICE SW

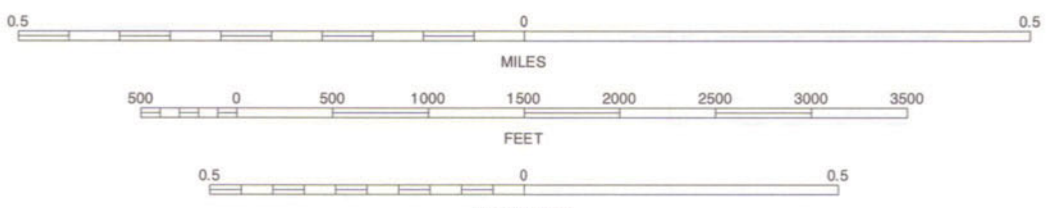
INDEX TO ADJOINING 3.75 MAPS

CENTREVILLE NE, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 17 OF 47

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

QUARTER QUADRANGLE LOCATION



1	2	3
4		5
6	7	8

1 CHESTERTOWN SE
2 CHURCH HILL SW
3 CHURCH HILL SE
4 CENTREVILLE NE
5 PRICE NE
6 CENTREVILLE SE
7 PRICE SW
8 PRICE SE

INDEX TO ADJOINING 3.75 MAPS

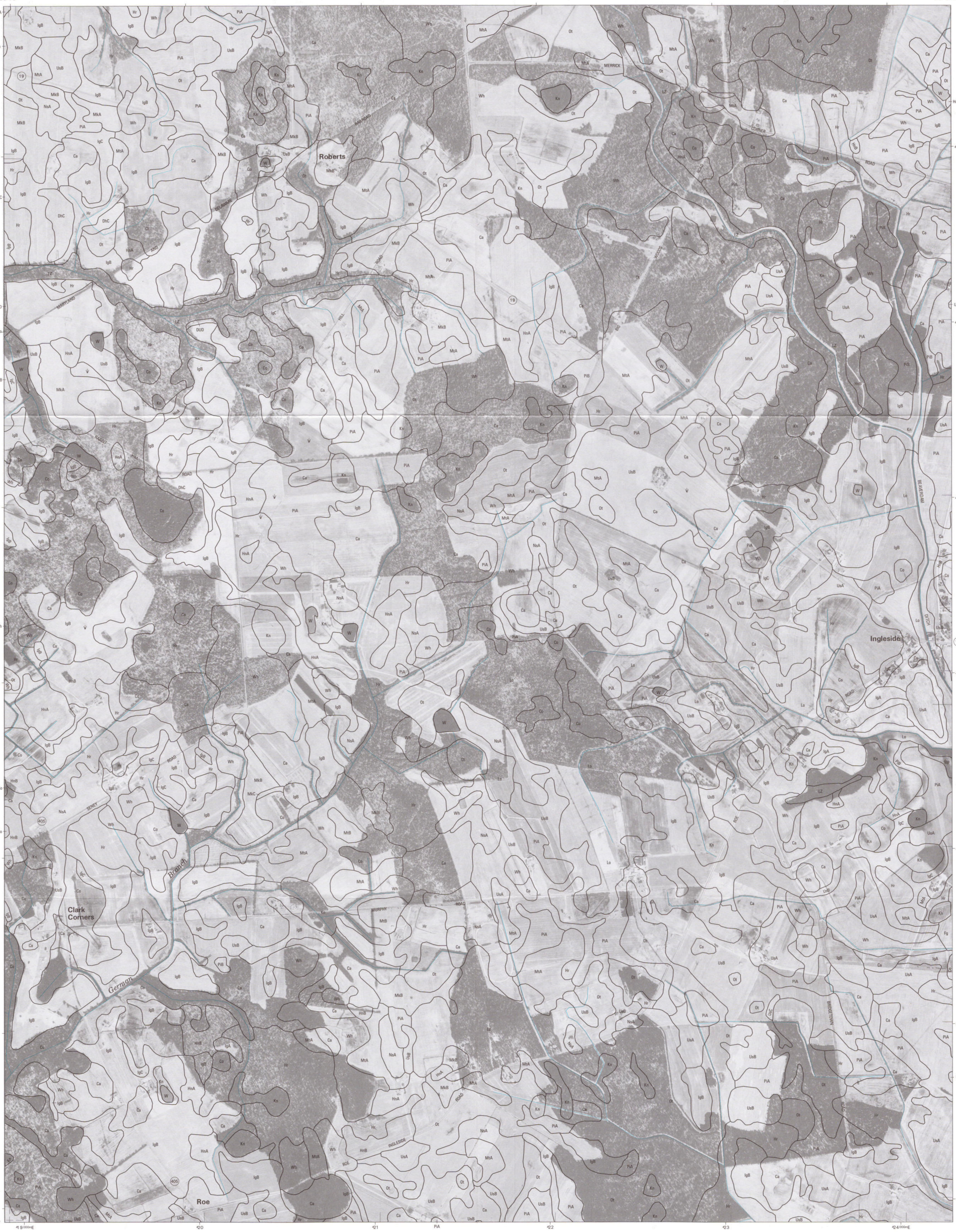
PRICE NW, MARYLAND

3.75 MINUTE SERIES
SHEET NUMBER 18 OF 47

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

QUEEN ANNE'S COUNTY, MARYLAND
PRICE NE QUADRANGLE
SHEET NUMBER 19 OF 47

75° 56'15" 39° 07'30" 75° 52'30"



39° 03'45"

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES: 0.5 0 0.5

FEET: 500 0 500 1000 1500 2000 2500 3000 3500

KILOMETERS: 0.5 0 0.5

1	2	3
4		5
6	7	8

1 CHURCH HILL SW
2 CHURCH HILL SE
3 SUDLERSVILLE SW
4 PRICE NW
5 GOLDSBORO NW
6 PRICE SW
7 PRICE SE
8 GOLDSBORO SW

INDEX TO ADJOINING 3.75 MAPS

PRICE NE, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 19 OF 47

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

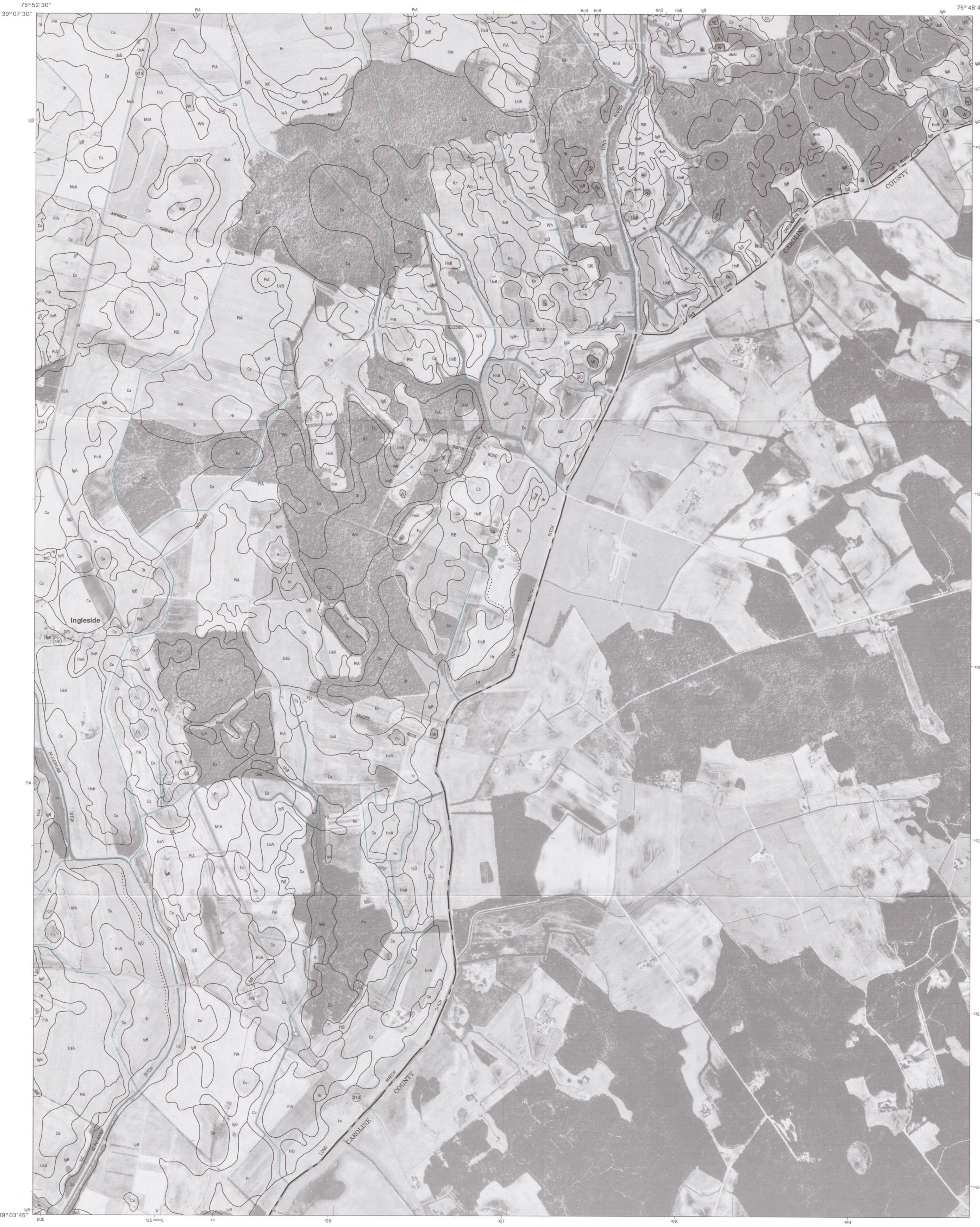
0.5 0 0.5
KILOMETERS

1	2	3
4		5
6	7	8

1 GALENA NE
2 MILLINGTON NW
3 MILLINGTON NE
4 GALENA SE
5 MILLINGTON SE
6 CHURCH HILL NE
7 SUDLERSVILLE NW
8 SUDLERSVILLE NE

INDEX TO ADJOINING 3.75 MAPS

MILLINGTON SW, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 2 OF 47



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

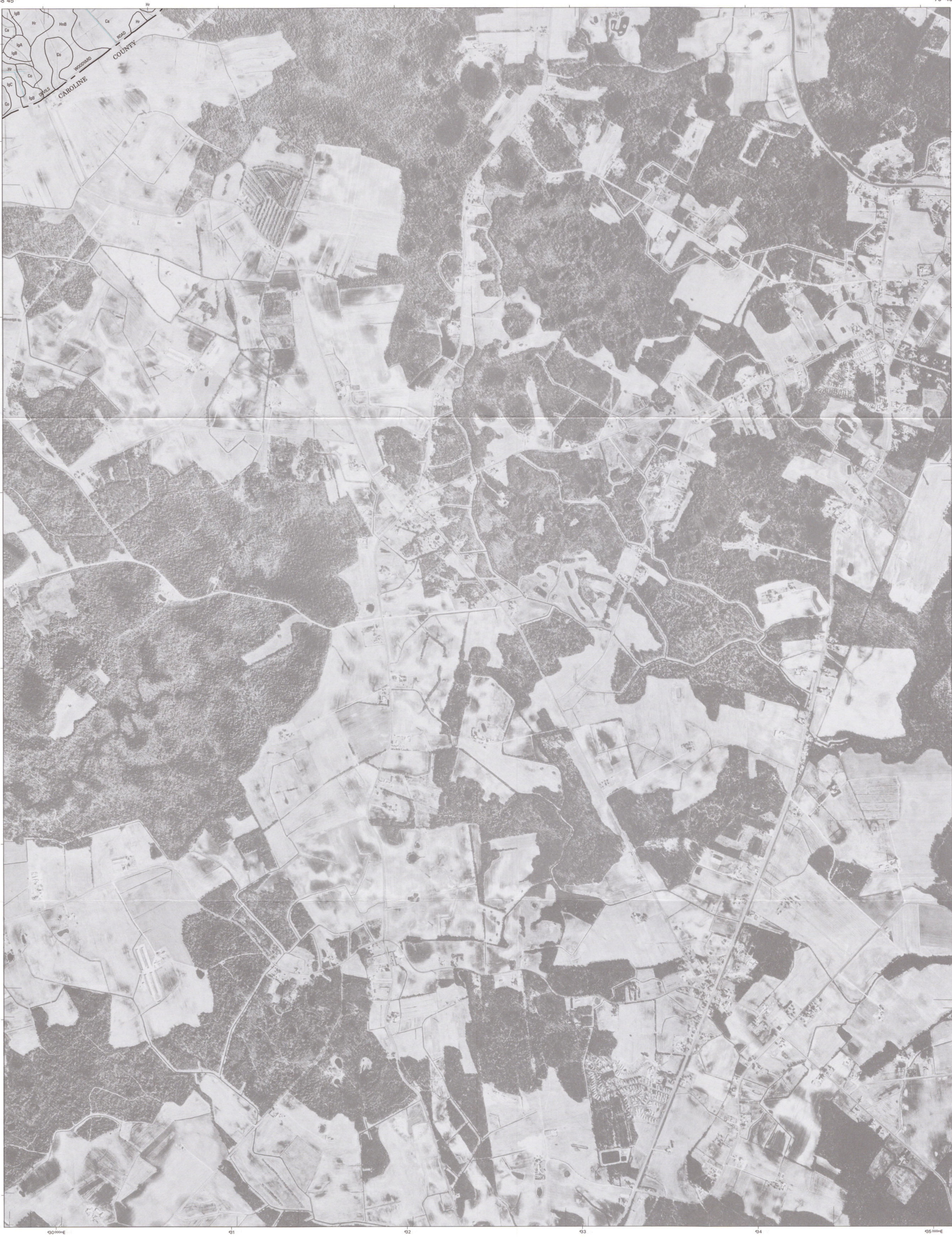
1	2	3
4		5
6	7	8

1 CHURCH HILL SE
2 SUDLERSVILLE SW
3 SUDLERSVILLE SE
4 PRICE NE
5 GOLDSBORO NE
6 PRICE SE
7 GOLDSBORO SW
8 GOLDSBORO SE

INDEX TO ADJOINING 3.75 MAPS

GOLDSBORO NW, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 20 OF 47

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

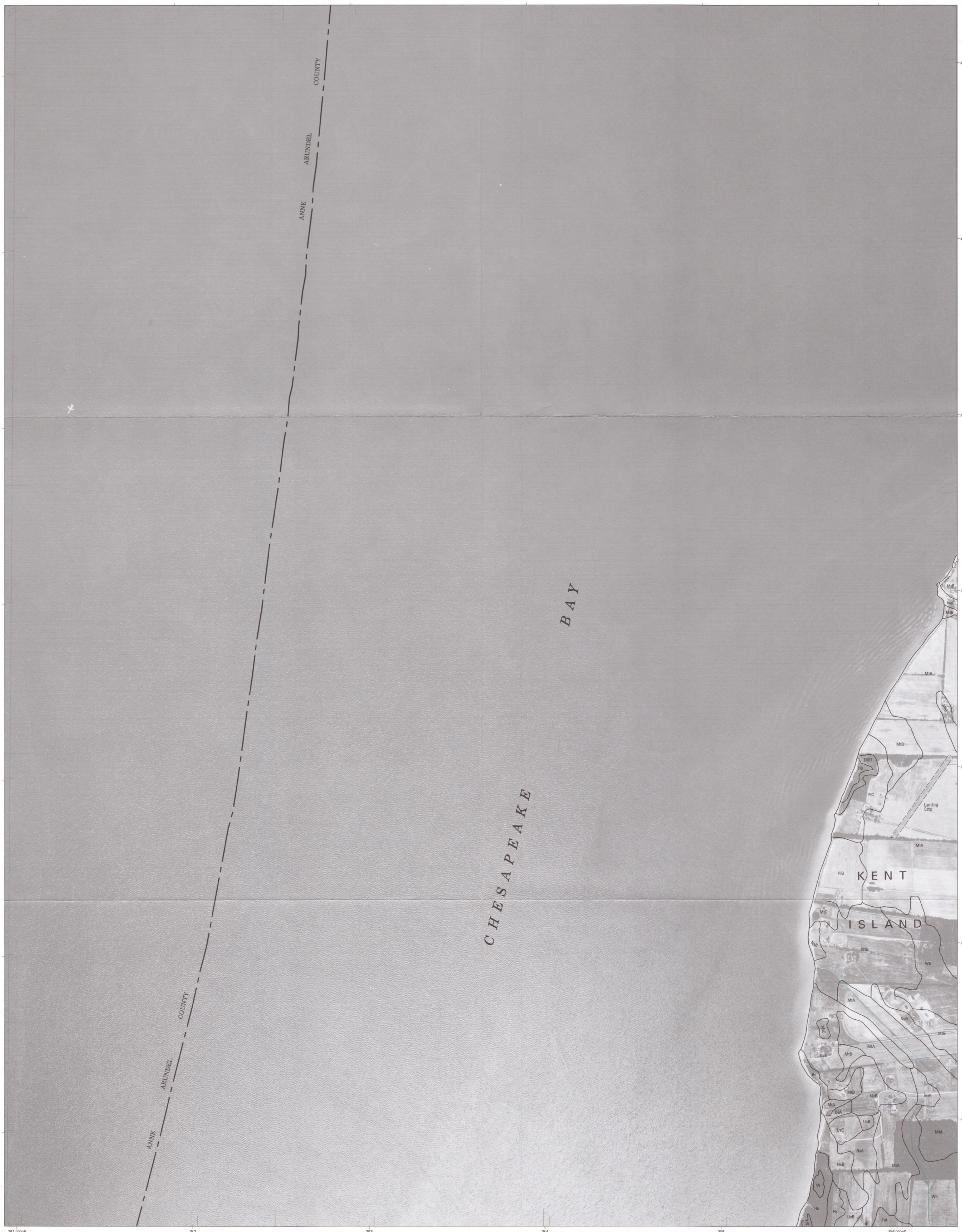
500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

1 SUDLERSVILLE SW
2 SUDLERSVILLE SE
3 KENTON SW
4 GOLDSBORO NW
5 MARYDEL NW
6 GOLDSBORO SW
7 GOLDSBORO SE
8 MARYDEL SW

INDEX TO ADJOINING 3.75 MAPS

GOLDSBORO NE, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 21 OF 47



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES 0.5 0 0.5

FEET 500 0 500 1000 1500 2000 2500 3000 3500

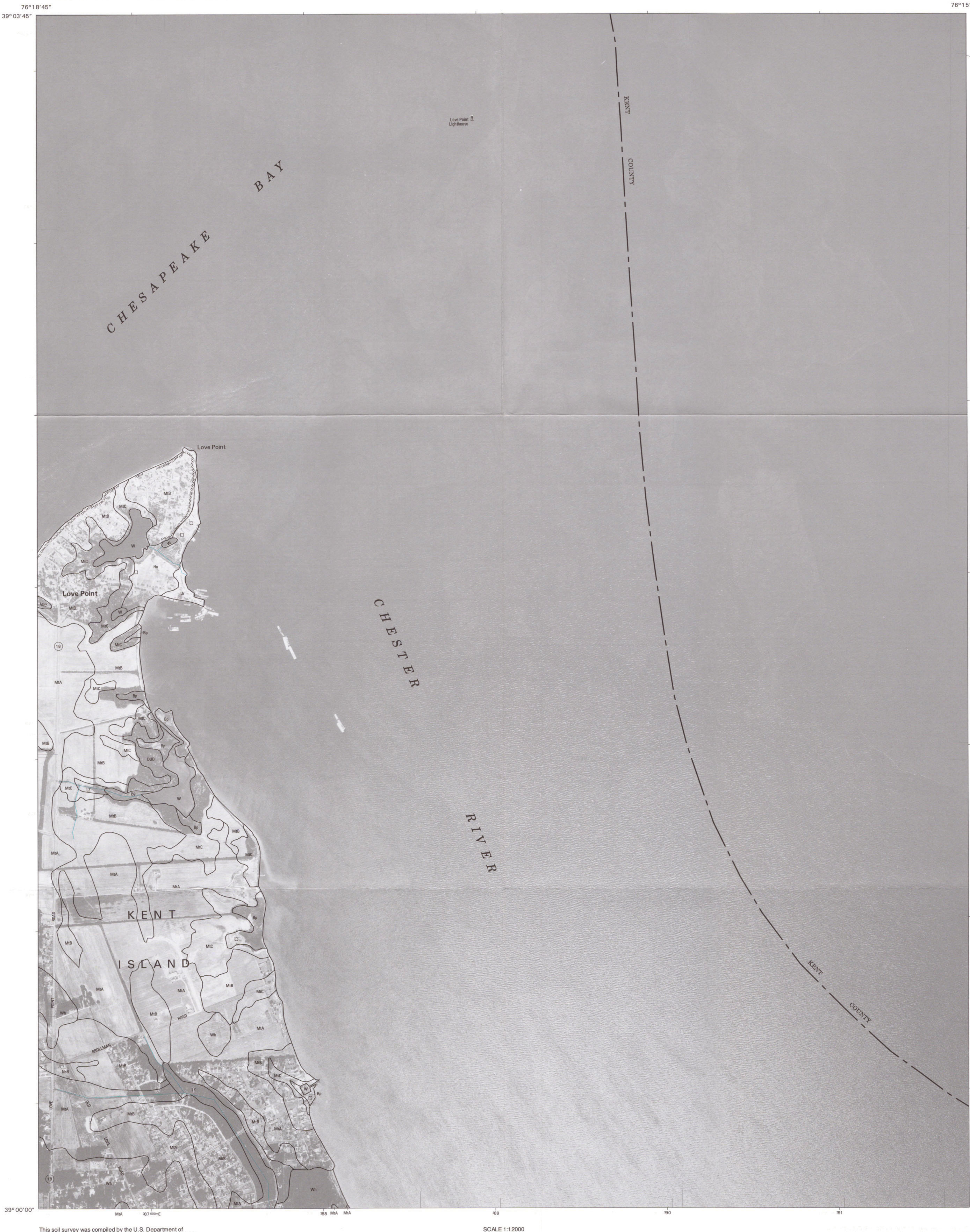
KILOMETERS 0.5 0 0.5

1	2	3
4		5
6	7	8

1 GIBSON ISLAND NE
2 LOVE POINT NW
3 LOVE POINT NE
4 GIBSON ISLAND SE
5 LOVE POINT SE
6 ANNAPOLIS NE
7 KENT ISLAND NW
8 KENT ISLAND NE

INDEX TO ADJOINING 3.75 MAPS

LOVE POINT SW, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 22 OF 47



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

1	2	3
4		5
6	7	8

1 LOVE POINT NW
2 LOVE POINT NE
3 LANGFORD CREEK NW
4 LOVE POINT SW
5 LANGFORD CREEK SW
6 KENT ISLAND NW
7 KENT ISLAND NE
8 QUEENSTOWN NW

INDEX TO ADJOINING 3.75 MAPS

LOVE POINT SE, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 23 OF 47

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5 MILES

500 0 500 1000 1500 2000 2500 3000 3500 FEET

0.5 0 0.5 KILOMETERS

1	2	3
4		5
6	7	8

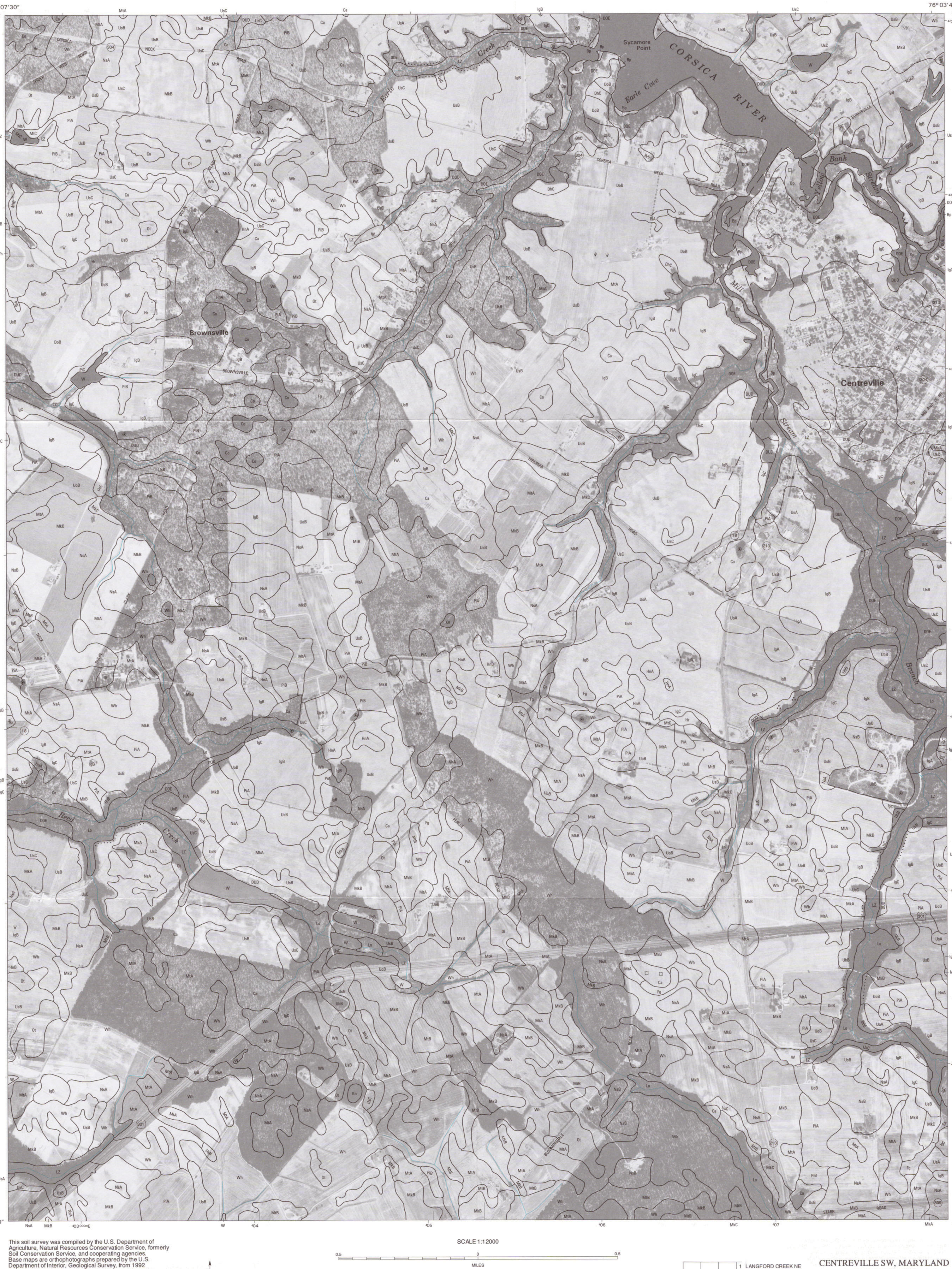
1 LANGFORD CREEK NW
2 LANGFORD CREEK NE
3 CENTREVILLE NW
4 LANGFORD CREEK SW
5 CENTREVILLE SW
6 QUEENSTOWN NW
7 QUEENSTOWN NE
8 WYE MILLS NW

INDEX TO ADJOINING 3.75 MAPS

LANGFORD CREEK SE, MARYLAND

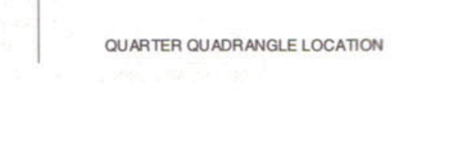
3.75 MINUTE SERIES
SHEET NUMBER 24 OF 47

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



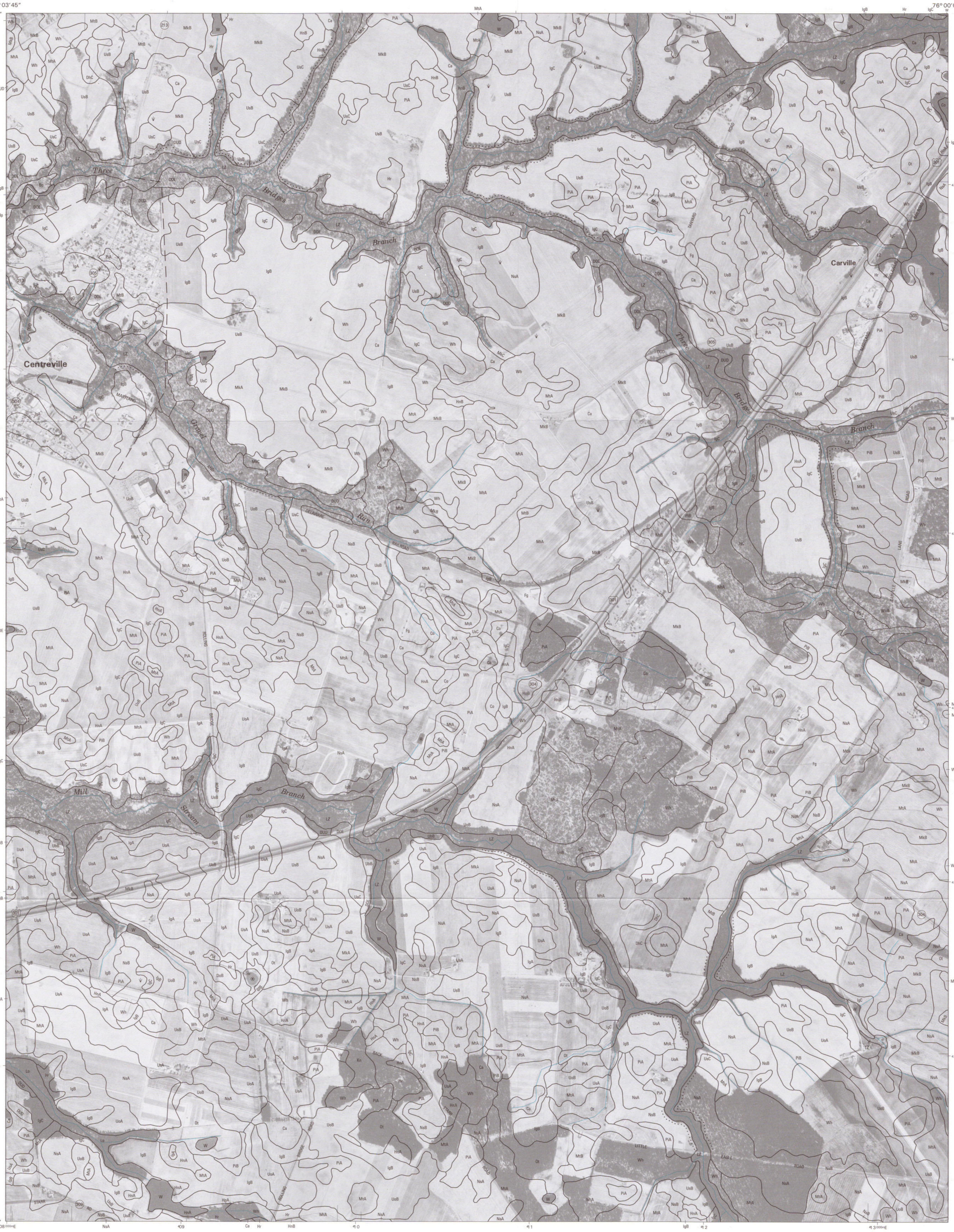
SCALE 1:12000

1	2	3
4	5	
6	7	8

1 LANGFORD CREEK NE
2 CENTREVILLE NW
3 CENTREVILLE NE
4 LANGFORD CREEK SE
5 CENTREVILLE SE
6 QUEENSTOWN NE
7 WYE MILLS NW
8 WYE MILLS NE

INDEX TO ADJOINING 3.75 MAPS

CENTREVILLE SW, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 25 OF 47



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

1 CENTREVILLE NW
2 CENTREVILLE NE
3 PRICE NW
4 CENTREVILLE SW
5 PRICE SW
6 WYE MILLS NW
7 WYE MILLS NE
8 RIDGELY NW

INDEX TO ADJOINING 3.75 MAPS

CENTREVILLE SE, MARYLAND

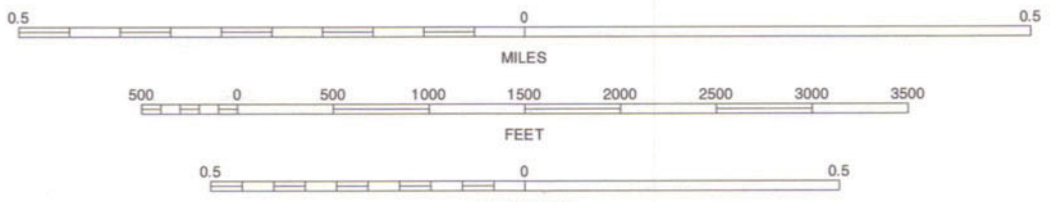
3.75 MINUTE SERIES
SHEET NUMBER 26 OF 47

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

QUARTER QUADRANGLE LOCATION

SCALE 1:12000



1	2	3
4		5
6	7	8

1 CENTREVILLE NE
2 PRICE NW
3 PRICE NE
4 CENTREVILLE SE
5 PRICE SE
6 WYE MILLS NE
7 RIDGELY NW
8 RIDGELY NE

INDEX TO ADJOINING 3.75 MAPS

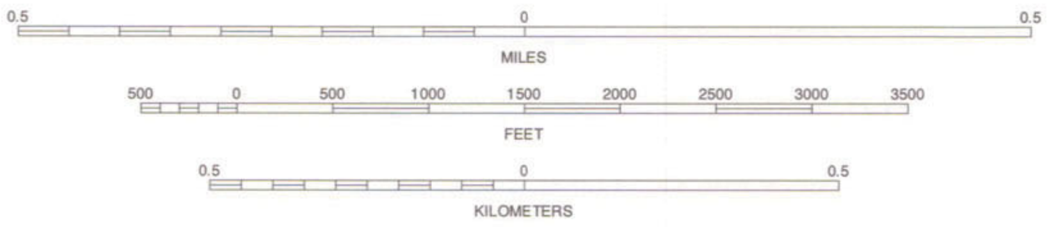
PRICE SW, MARYLAND

3.75 MINUTE SERIES
SHEET NUMBER 27 OF 47

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

SCALE 1:12000



1	2	3
4		5
6	7	8

1 PRICE NW
2 PRICE NE
3 GOLDSBORO NW
4 PRICE SW
5 GOLDSBORO SW
6 RIDGELY NW
7 RIDGELY NE
8 DENTON NW

INDEX TO ADJOINING 3.75 MAPS

PRICE SE, MARYLAND

3.75 MINUTE SERIES
SHEET NUMBER 28 OF 47

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

QUEEN ANNE'S COUNTY, MARYLAND
GOLDSBORO SW QUADRANGLE
SHEET NUMBER 29 OF 47

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

1	2	3
4		5
6	7	8

1 PRICE NE
2 GOLDSBORO NW
3 GOLDSBORO NE
4 PRICE SE
5 GOLDSBORO SE
6 RIDGELY NE
7 DENTON NW
8 DENTON NE

INDEX TO ADJOINING 3.75 MAPS

GOLDSBORO SW, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 29 OF 47

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

1	2	3
4		5
6	7	8

1 HANESVILLE SE
2 BETTERTON SW
3 BETTERTON SE
4 ROCK HALL NE
5 CHESTERTOWN NE
6 ROCK HALL SE
7 CHESTERTOWN SW
8 CHESTERTOWN SE

INDEX TO ADJOINING 3.75 MAPS

CHESTERTOWN NW, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 3 OF 47

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES: 0.5 — 0 — 0.5

FEET: 500 — 0 — 500 — 1000 — 1500 — 2000 — 2500 — 3000 — 3500

KILOMETERS: 0.5 — 0 — 0.5

1	2	3
4		5
6	7	8

1 GIBSON ISLAND SE
2 LOVE POINT SW
3 LOVE POINT SE
4 ANNAPOLIS NE
5 KENT ISLAND NE
6 ANNAPOLIS SE
7 KENT ISLAND SW
8 KENT ISLAND SE

INDEX TO ADJOINING 3.75 MAPS

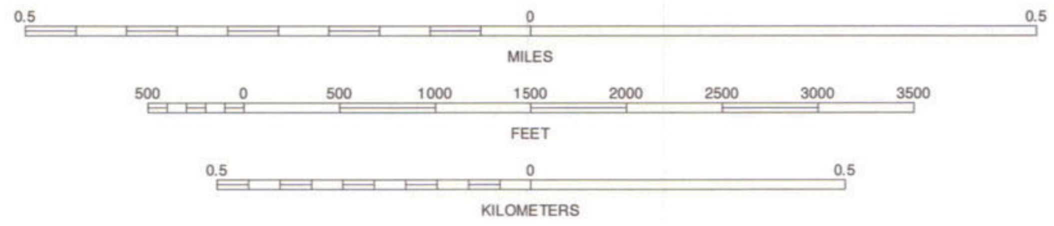
KENT ISLAND NW, MARYLAND

3.75 MINUTE SERIES
SHEET NUMBER 30 OF 47

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

QUEEN ANNE'S COUNTY, MARYLAND
KENT ISLAND NE QUADRANGLE
SHEET NUMBER 31 OF 47

SCALE 1:12000



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

QUARTER QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 LOVE POINT SW
2 LOVE POINT SE
3 LANGFORD CREEK SW
4 KENT ISLAND NW
5 QUEENSTOWN NW
6 KENT ISLAND SW
7 KENT ISLAND SE
8 QUEENSTOWN SW

INDEX TO ADJOINING 3.75 MAPS

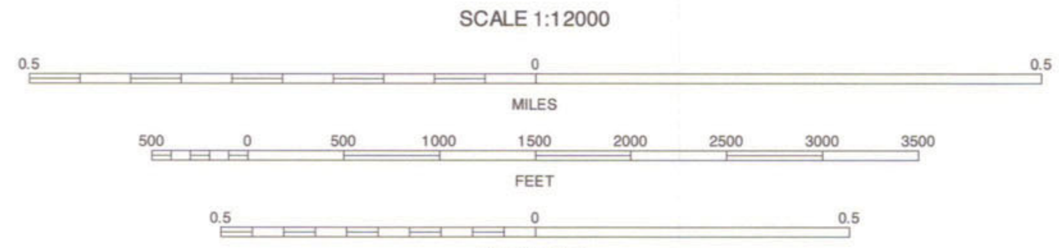
KENT ISLAND NE, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 31 OF 47

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

QUARTER QUADRANGLE LOCATION

SCALE 1:12000



1	2	3	1 LOVE POINT SE
			2 LANGFORD CREEK SW
4		5	3 LANGFORD CREEK SE
			4 KENT ISLAND NE
6	7	8	5 QUEENSTOWN NE
			6 KENT ISLAND SE
			7 QUEENSTOWN SW
			8 QUEENSTOWN SE

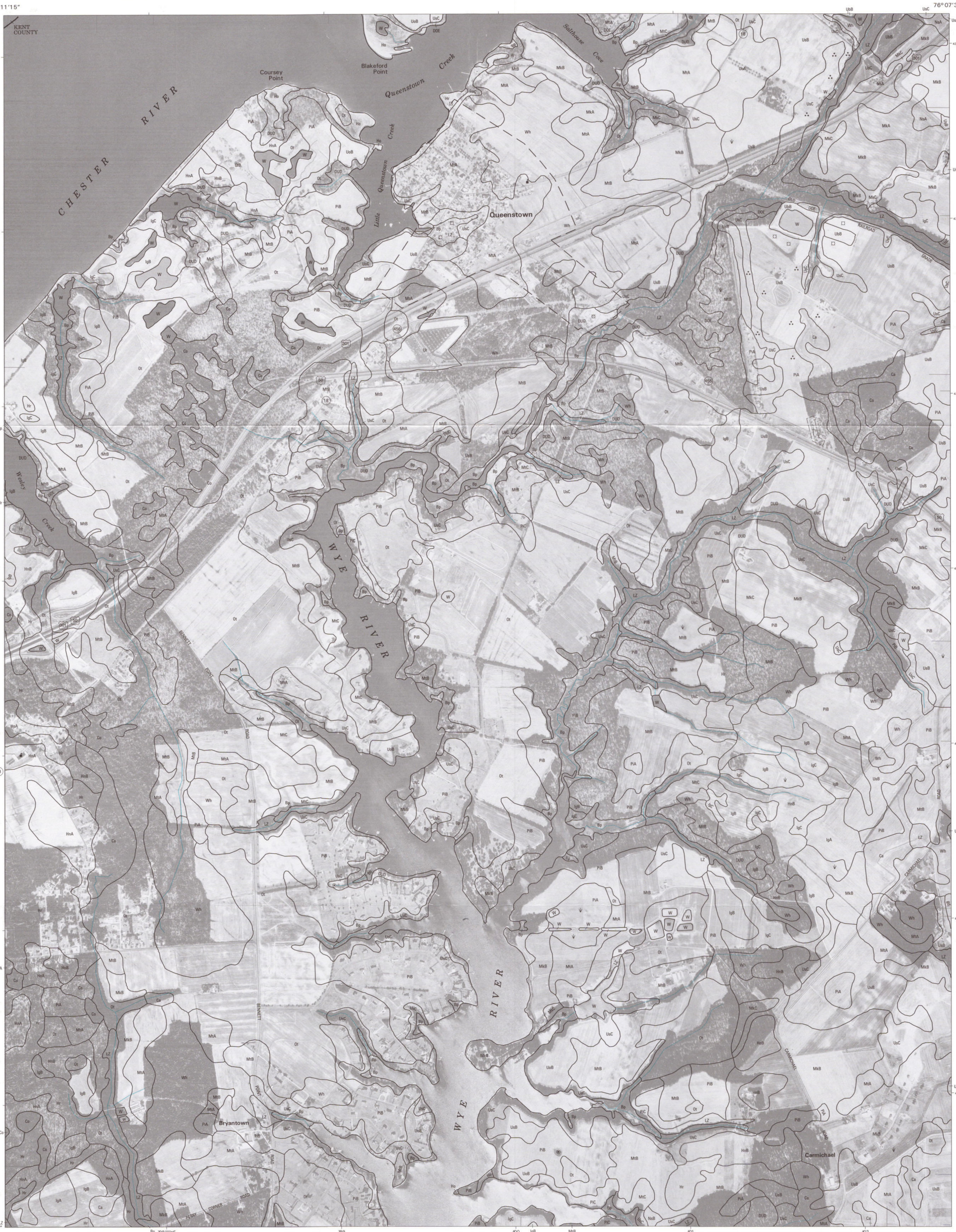
INDEX TO ADJOINING 3.75 MAPS

QUEENSTOWN NW, MARYLAND

3.75 MINUTE SERIES
SHEET NUMBER 32 OF 47

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

QUEEN ANNE'S COUNTY, MARYLAND
QUEENSTOWN NE QUADRANGLE
SHEET NUMBER 33 OF 47

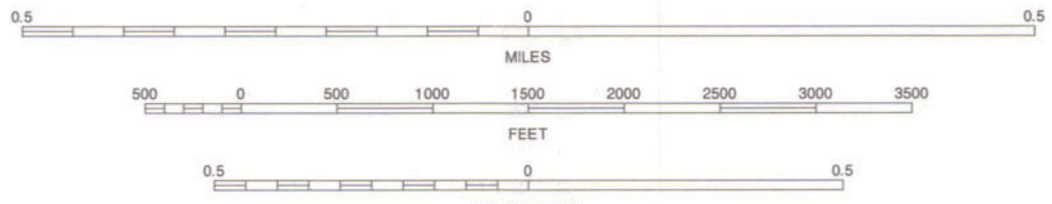


This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

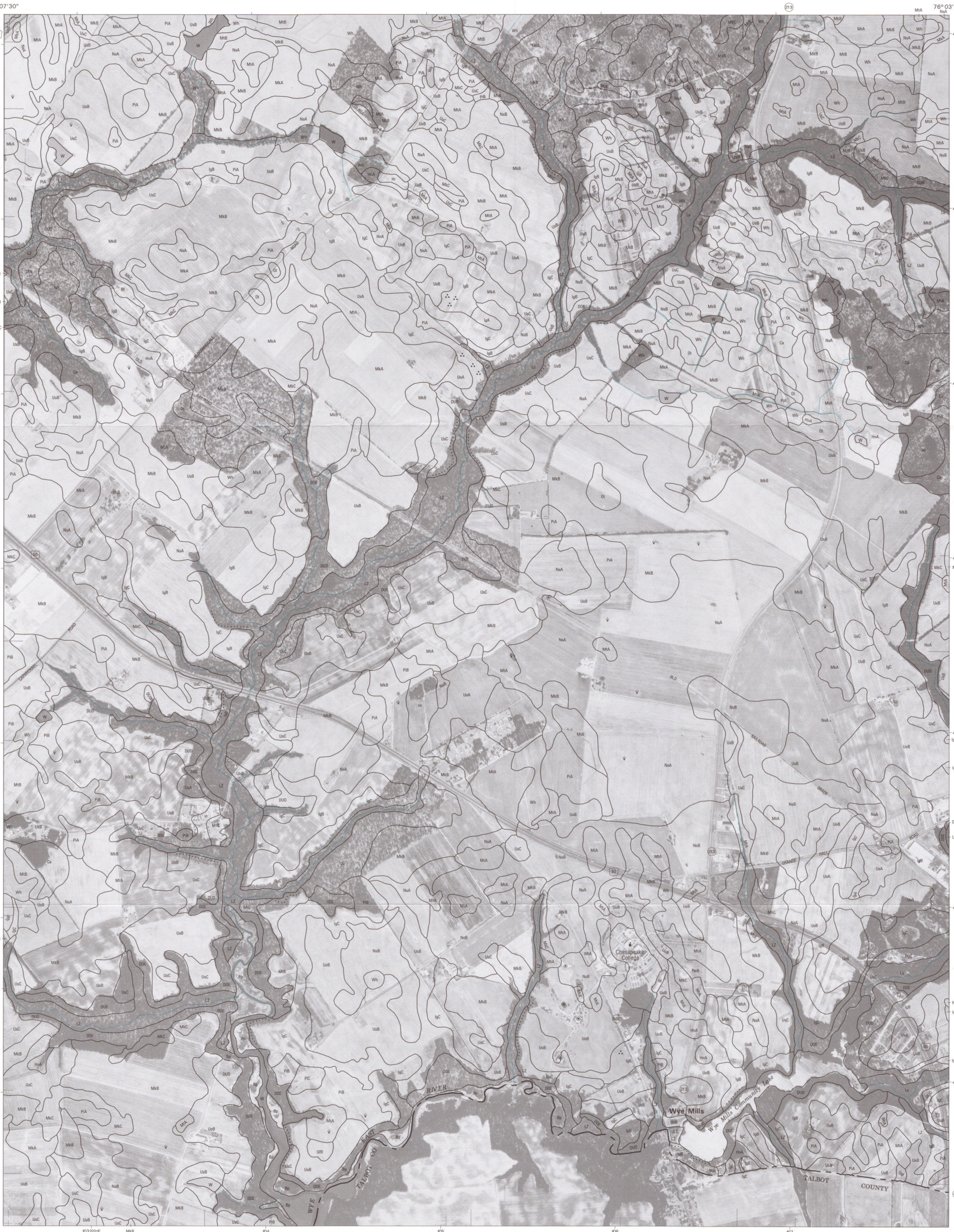


1	2	3	
4		5	
6	7	8	

1 LANGFORD CREEK SW
2 LANGFORD CREEK SE
3 CENTREVILLE SW
4 QUEENSTOWN NW
5 WYE MILLS NW
6 QUEENSTOWN SW
7 QUEENSTOWN SE
8 WYE MILLS SW

INDEX TO ADJOINING 3.75 MAPS

QUEENSTOWN NE, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 33 OF 47

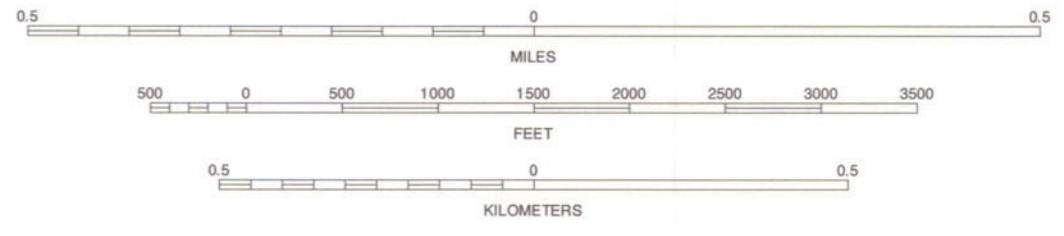


This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

QUARTER QUADRANGLE LOCATION

SCALE 1:12000



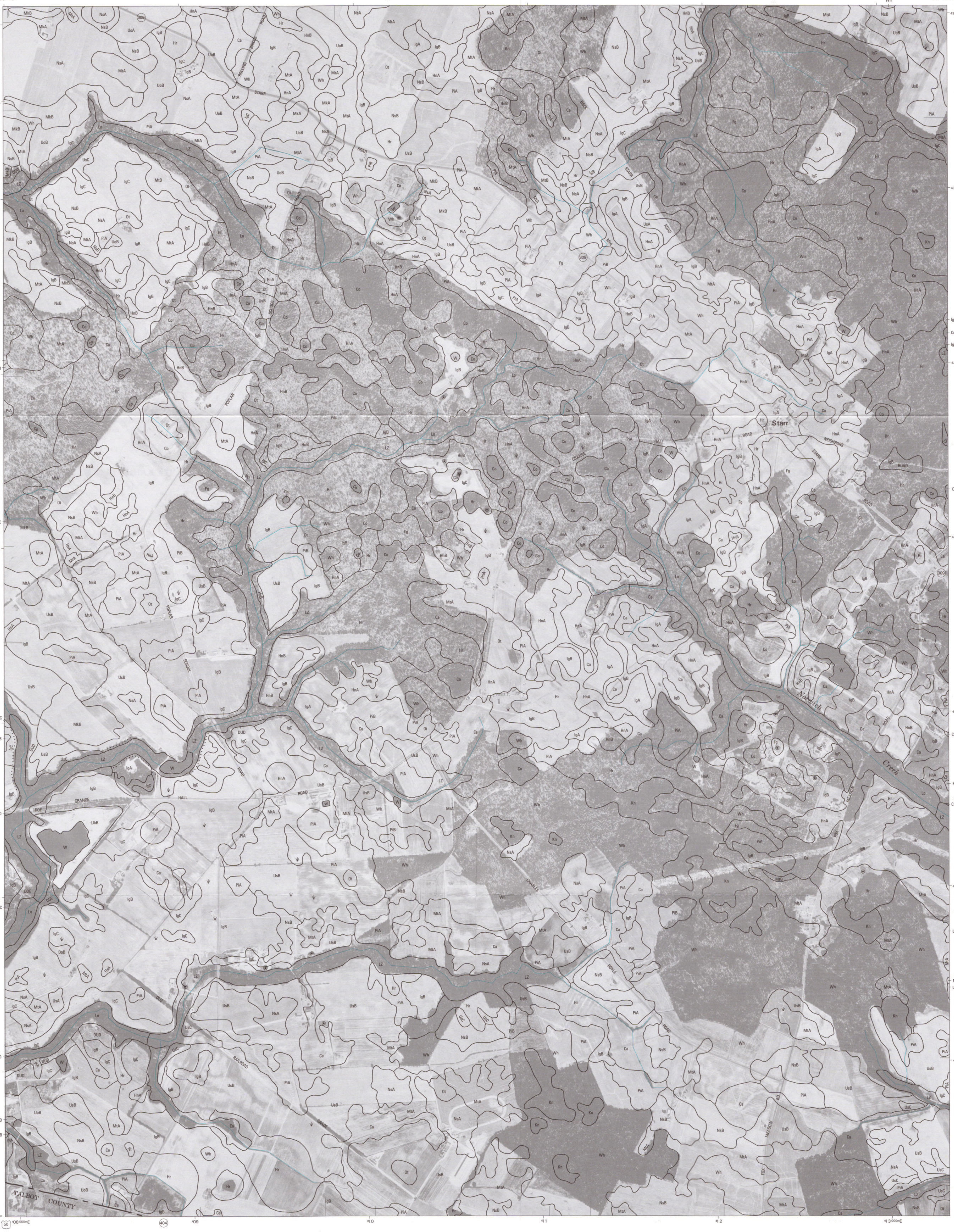
1	2	3
4		5
6	7	8

1 LANGFORD CREEK SE
2 CENTREVILLE SW
3 CENTREVILLE SE
4 QUEENSTOWN NE
5 WYE MILLS NE
6 QUEENSTOWN SE
7 WYE MILLS SW
8 WYE MILLS SE

INDEX TO ADJOINING 3.75 MAPS

WYE MILLS NW, MARYLAND

3.75 MINUTE SERIES
SHEET NUMBER 34 OF 47



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

1	2	3
4		5
6	7	8

1 CENTREVILLE SW
2 CENTREVILLE SE
3 PRICE SW
4 WYE MILLS NW
5 RIDGELY NW
6 WYE MILLS SW
7 WYE MILLS SE
8 RIDGELY SW

INDEX TO ADJOINING 3.75 MAPS

WYE MILLS NE, MARYLAND

3.75 MINUTE SERIES
SHEET NUMBER 35 OF 47

76°00'00"
39°00'00"

75°56'15"

38°56'15"

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

1	2	3
4		5
6	7	8

1 CENTREVILLE SE
2 PRICE SW
3 PRICE SE
4 WYE MILLS NE
5 RIDGELY NE
6 WYE MILLS SE
7 RIDGELY SW
8 RIDGELY SE

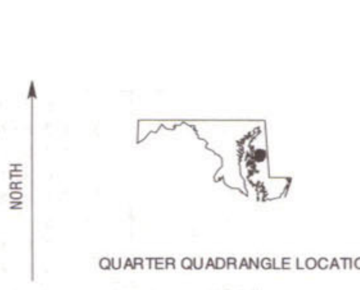
INDEX TO ADJOINING 3.75 MAPS

RIDGELY NW, MARYLAND

3.75 MINUTE SERIES
SHEET NUMBER 36 OF 47

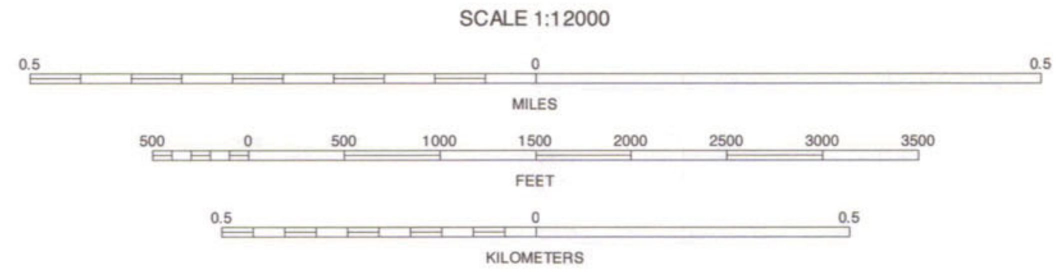
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



QUARTER QUADRANGLE LOCATION

SCALE 1:12000



1	2	3
4		5
6	7	8

1 PRICE SW
2 PRICE SE
3 GOLDSBORO SW
4 RIDGELY NW
5 DENTON NW
6 RIDGELY SW
7 RIDGELY SE
8 DENTON SW

INDEX TO ADJOINING 3.75 MAPS

RIDGELY NE, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 37 OF 47

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

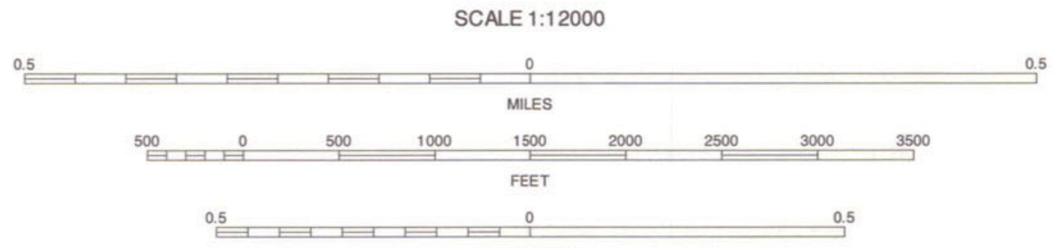
QUEEN ANNE'S COUNTY, MARYLAND
KENT ISLAND SW QUADRANGLE
SHEET NUMBER 38 OF 47

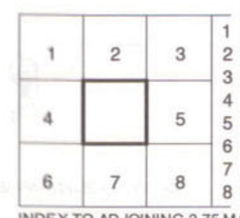
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

QUARTER QUADRANGLE LOCATION

SCALE 1:12000





1 ANNAPOLIS NE
2 KENT ISLAND NW
3 KENT ISLAND NE
4 ANNAPOLIS SE
5 KENT ISLAND SE
6
7 CLAIBORNE NW
8 CLAIBORNE NE

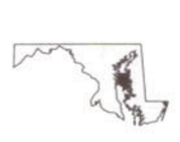
INDEX TO ADJOINING 3.75 MAPS

KENT ISLAND SW, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 38 OF 47

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES: 0.5 0 0.5

FEET: 500 0 500 1000 1500 2000 2500 3000 3500

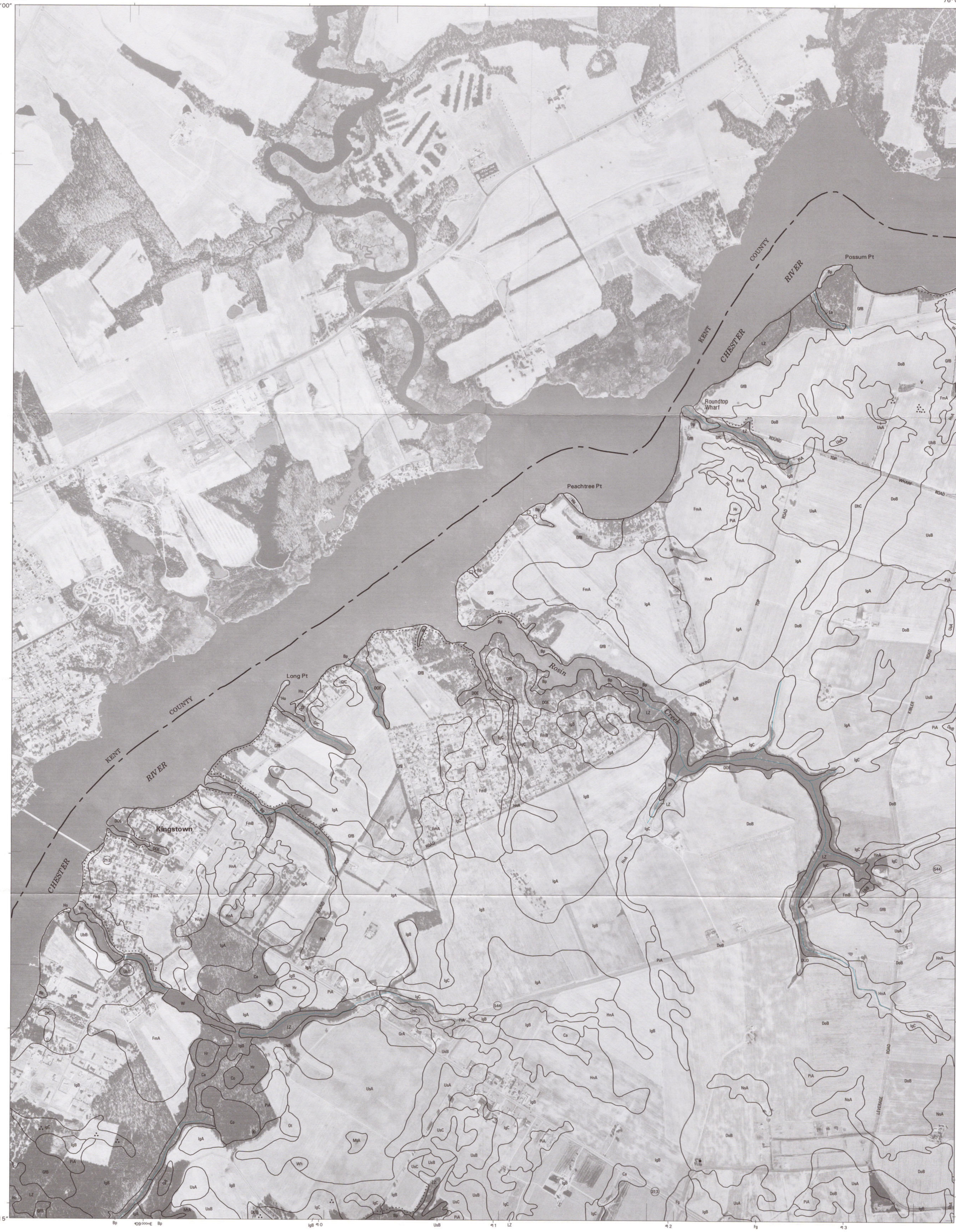
KILOMETERS: 0.5 0 0.5

1	2	3
4		5
6	7	8

1 KENT ISLAND NW
2 KENT ISLAND NE
3 QUEENSTOWN NW
4 KENT ISLAND SW
5 QUEENSTOWN SW
6 CLAIBORNE NW
7 CLAIBORNE NE
8 SAINT MICHAELS NW

INDEX TO ADJOINING 3.75 MAPS

KENT ISLAND SE, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 39 OF 47



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5 MILES

500 0 500 1000 1500 2000 2500 3000 3500 FEET

0.5 0 0.5 KILOMETERS

1	2	3
4		5
6	7	8

1 BETTERTON SW
2 BETTERTON SE
3 GALENA SW
4 CHESTERTOWN NW
5 CHURCH HILL NW
6 CHESTERTOWN SW
7 CHESTERTOWN SE
8 CHURCH HILL SW

INDEX TO ADJOINING 3.75 MAPS

CHESTERTOWN NE, MARYLAND

3.75 MINUTE SERIES
SHEET NUMBER 4 OF 47

76°15'00"
76°11'15"
38°56'15"

38°52'30"
392000mE
393
394
395
396
4310000mN
4309
4308
4307
4306
4305
4304000mN

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

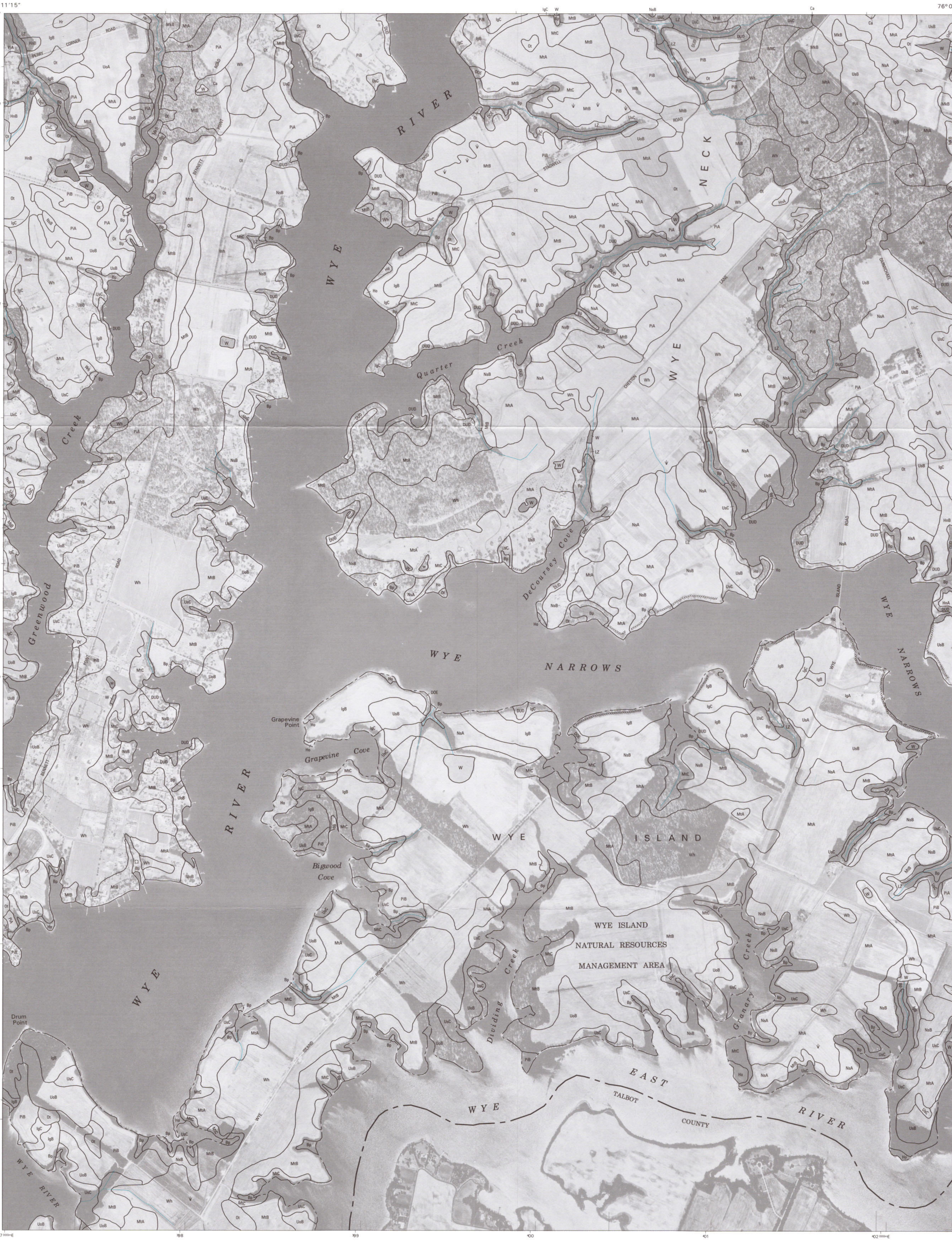
0.5 0 0.5
KILOMETERS

1	2	3
4		5
6	7	8

1 KENT ISLAND NE
2 QUEENSTOWN NW
3 QUEENSTOWN NE
4 KENT ISLAND SE
5 QUEENSTOWN SE
6 CLAIBORNE NE
7 SAINT MICHAELS NW
8 SAINT MICHAELS NE

INDEX TO ADJOINING 3.75 MAPS

QUEENSTOWN SW, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 40 OF 47



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES: 0.5 — 0 — 0.5

FEET: 500 — 0 — 500 — 1000 — 1500 — 2000 — 2500 — 3000 — 3500

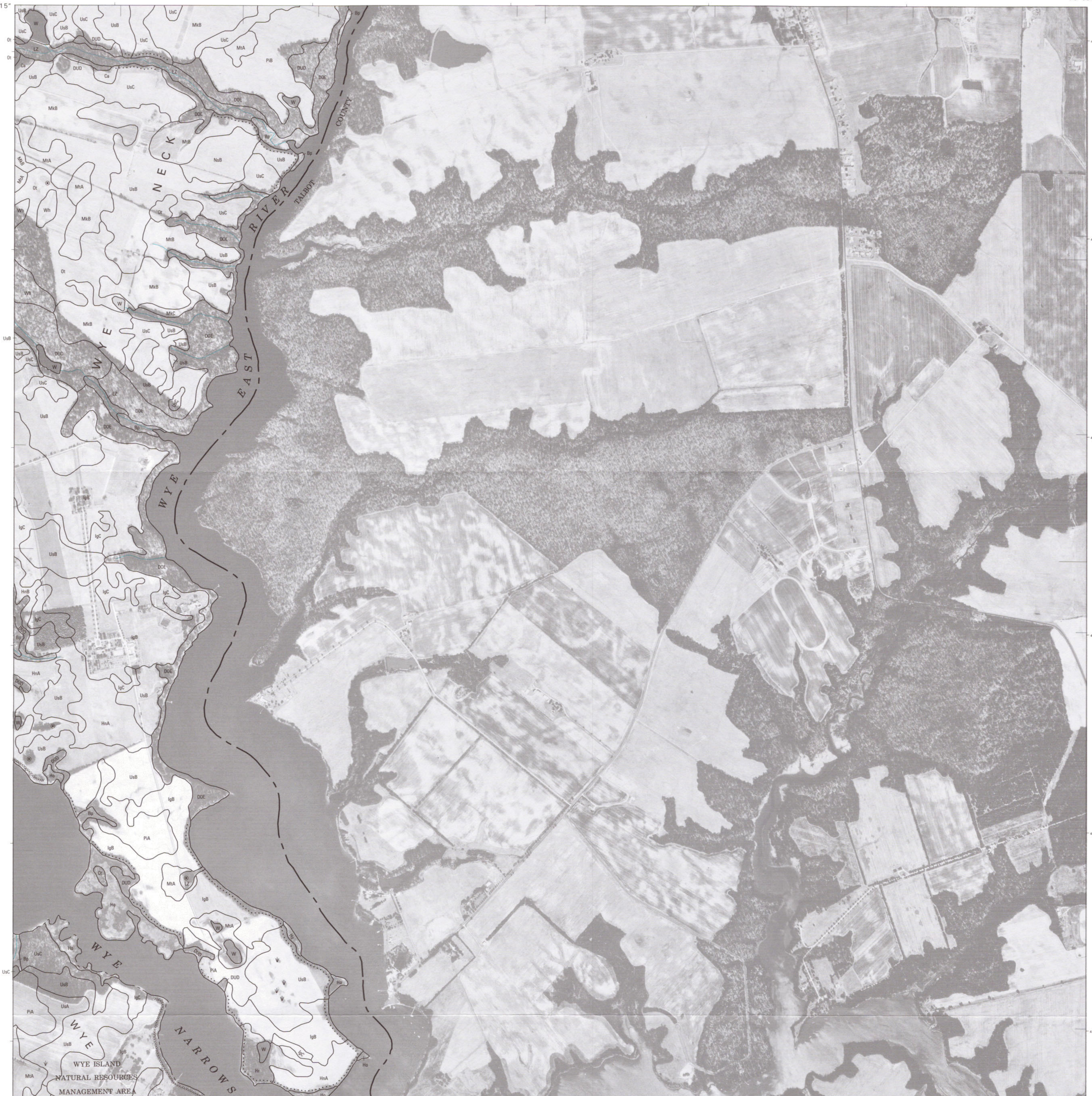
KILOMETERS: 0.5 — 0 — 0.5

1	2	3
4		5
6	7	8

1 QUEENSTOWN NW
2 QUEENSTOWN NE
3 WYE MILLS NW
4 QUEENSTOWN SW
5 WYE MILLS SW
6 SAINT MICHAELS NW
7 SAINT MICHAELS NE
8 EASTON NW

INDEX TO ADJOINING 3.75 MAPS

QUEENSTOWN SE, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 41 OF 47



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

1	2	3
4		5
6	7	8

1 QUEENSTOWN NE
2 WYE MILLS NW
3 WYE MILLS NE
4 QUEENSTOWN SE
5 WYE MILLS SE
6 SAINT MICHAELS NE
7 EASTON NW
8 EASTON NE

INDEX TO ADJOINING 3.75 MAPS

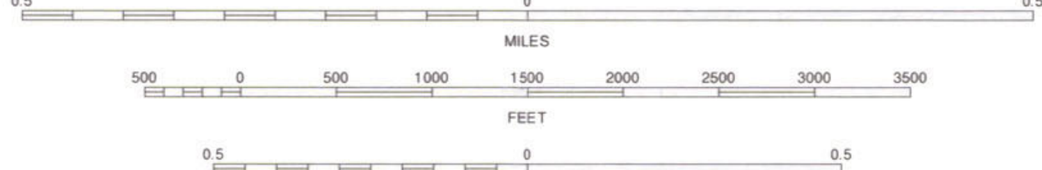
WYE MILLS SW, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 42 OF 47

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

QUARTER QUADRANGLE LOCATION

SCALE 1:12000



1	2	3
4		5
6	7	8

1 WYE MILLS NW
2 WYE MILLS NE
3 RIDGELY NW
4 WYE MILLS SW
5 RIDGELY SW
6 EASTON NW
7 EASTON NE
8 FOWLING CREEK NW

INDEX TO ADJOINING 3.75 MAPS

WYE MILLS SE, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 43 OF 47

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

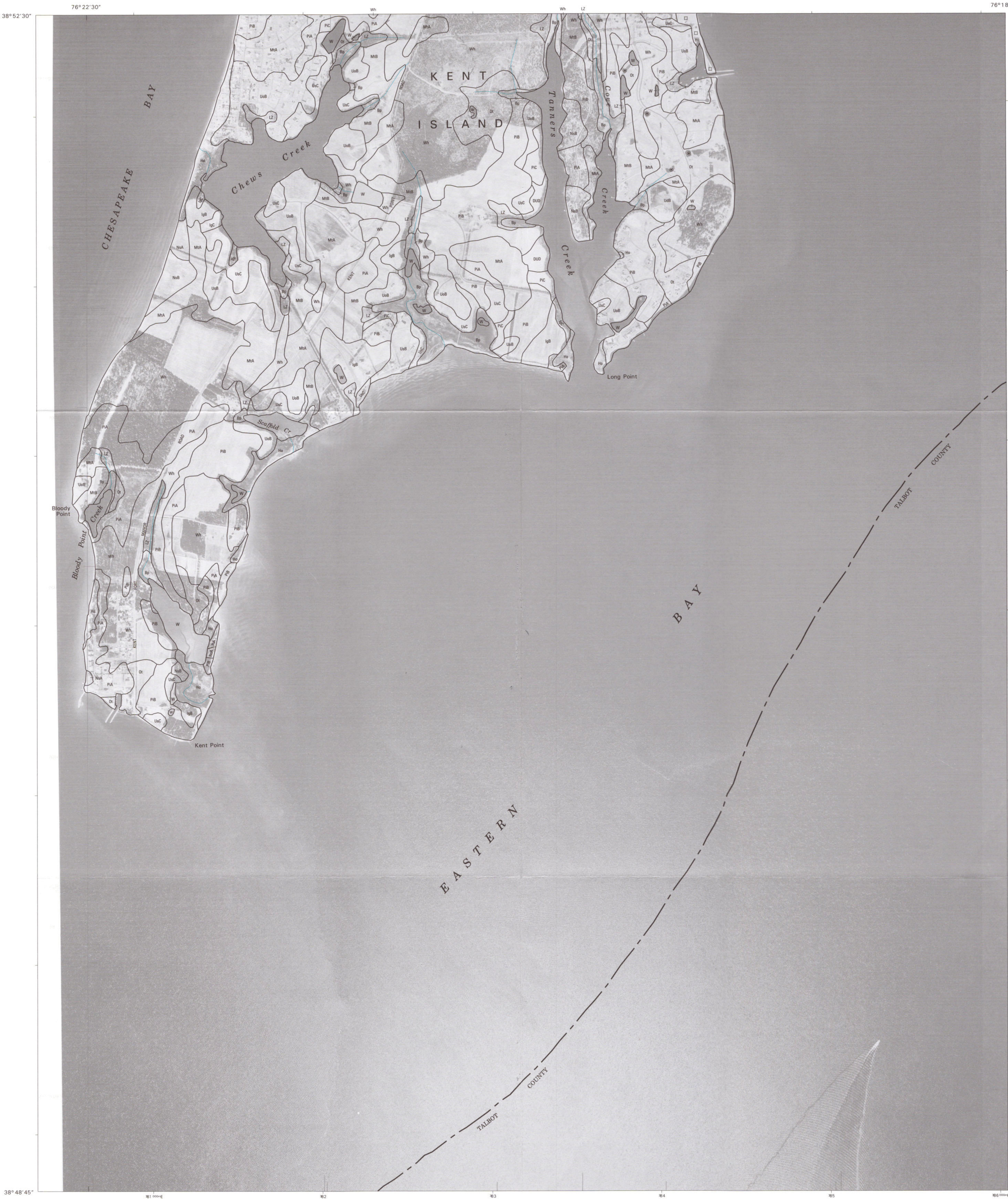
0.5 0 0.5
KILOMETERS

1	2	3
4		5
6	7	8

1 WYE MILLS NE
2 RIDGELY NW
3 RIDGELY NE
4 WYE MILLS SE
5 RIDGELY SE
6 EASTON NE
7 FOWLING CREEK NW
8 FOWLING CREEK NE

INDEX TO ADJOINING 3.75 MAPS

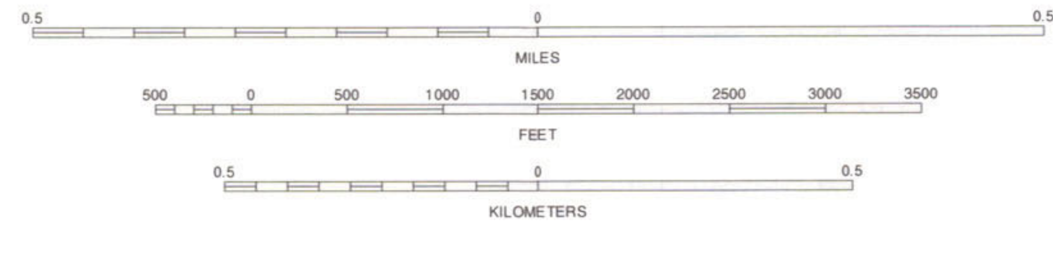
RIDGELY SW, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 44 OF 47



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

SCALE 1:12000



1	2	3
4		5
6	7	8

1 ANNAPOLIS SE
2 KENT ISLAND SW
3 KENT ISLAND SE
4
5 CLAIBORNE NE
6
7 CLAIBORNE SW
8 CLAIBORNE SE

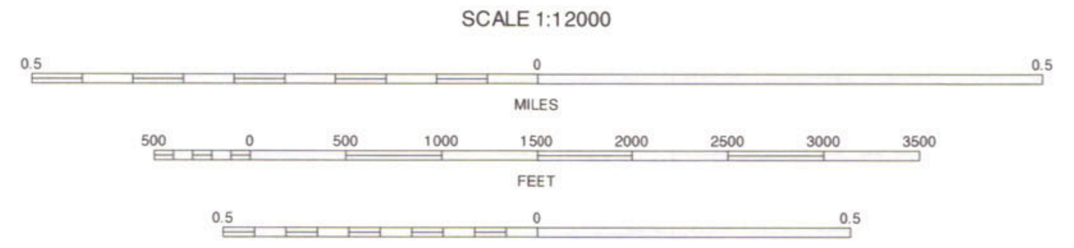
INDEX TO ADJOINING 3.75 MAPS

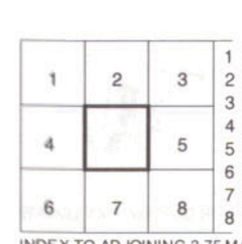
CLAIBORNE NW, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 45 OF 47

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

SCALE 1:12000





1 KENT ISLAND SE
2 QUEENSTOWN SW
3 QUEENSTOWN SE
4 CLAIBORNE NE
5 SAINT MICHAELS NE
6 CLAIBORNE SE
7 SAINT MICHAELS SW
8 SAINT MICHAELS SE

INDEX TO ADJOINING 3.75 MAPS

SAINT MICHAELS NW, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 46 OF 47

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

1	2	3
4		5
6	7	8

1 QUEENSTOWN SW
2 QUEENSTOWN SE
3 WYE MILLS SW
4 SAINT MICHAELS NW
5 EASTON NW
6 SAINT MICHAELS SW
7 SAINT MICHAELS SE
8 EASTON SW

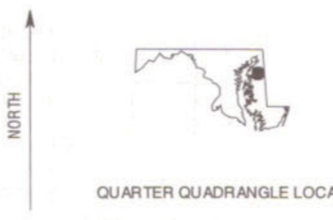
INDEX TO ADJOINING 3.75 MAPS

SAINT MICHAELS NE, MARYLAND

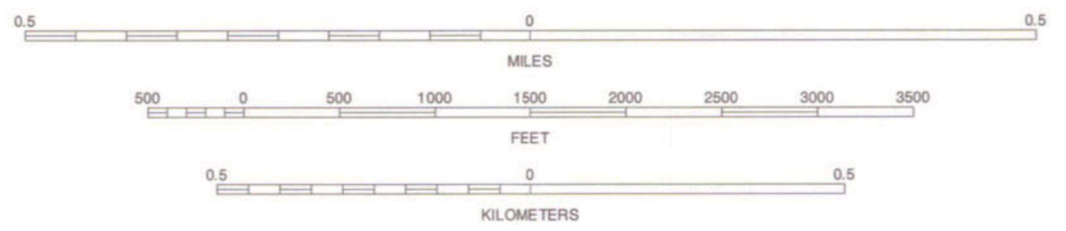
3.75 MINUTE SERIES
SHEET NUMBER 47 OF 47

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



SCALE 1:12000



1	2	3
4		5
6	7	8

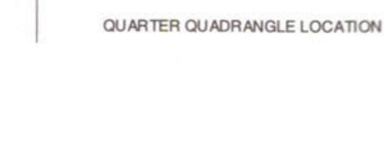
1 BETTERTON SE
2 GALENA SW
3 GALENA SE
4 CHESTERTOWN NE
5 CHURCH HILL NE
6 CHESTERTOWN SE
7 CHURCH HILL SW
8 CHURCH HILL SE

INDEX TO ADJOINING 3.75 MAPS

CHURCH HILL NW, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 5 OF 47

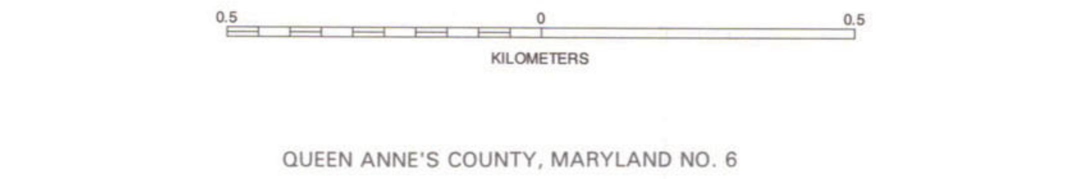
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



QUARTER QUADRANGLE LOCATION

SCALE 1:12000



1	2	3
4		5
6	7	8

1 GALENA SW
2 GALENA SE
3 MILLINGTON SW
4 CHURCH HILL NW
5 SUDLERSVILLE NW
6 CHURCH HILL SW
7 CHURCH HILL SE
8 SUDLERSVILLE SW

INDEX TO ADJOINING 3.75 MAPS

CHURCH HILL NE, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 6 OF 47

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES: 0.5 0 0.5

FEET: 500 0 500 1000 1500 2000 2500 3000 3500

KILOMETERS: 0.5 0 0.5

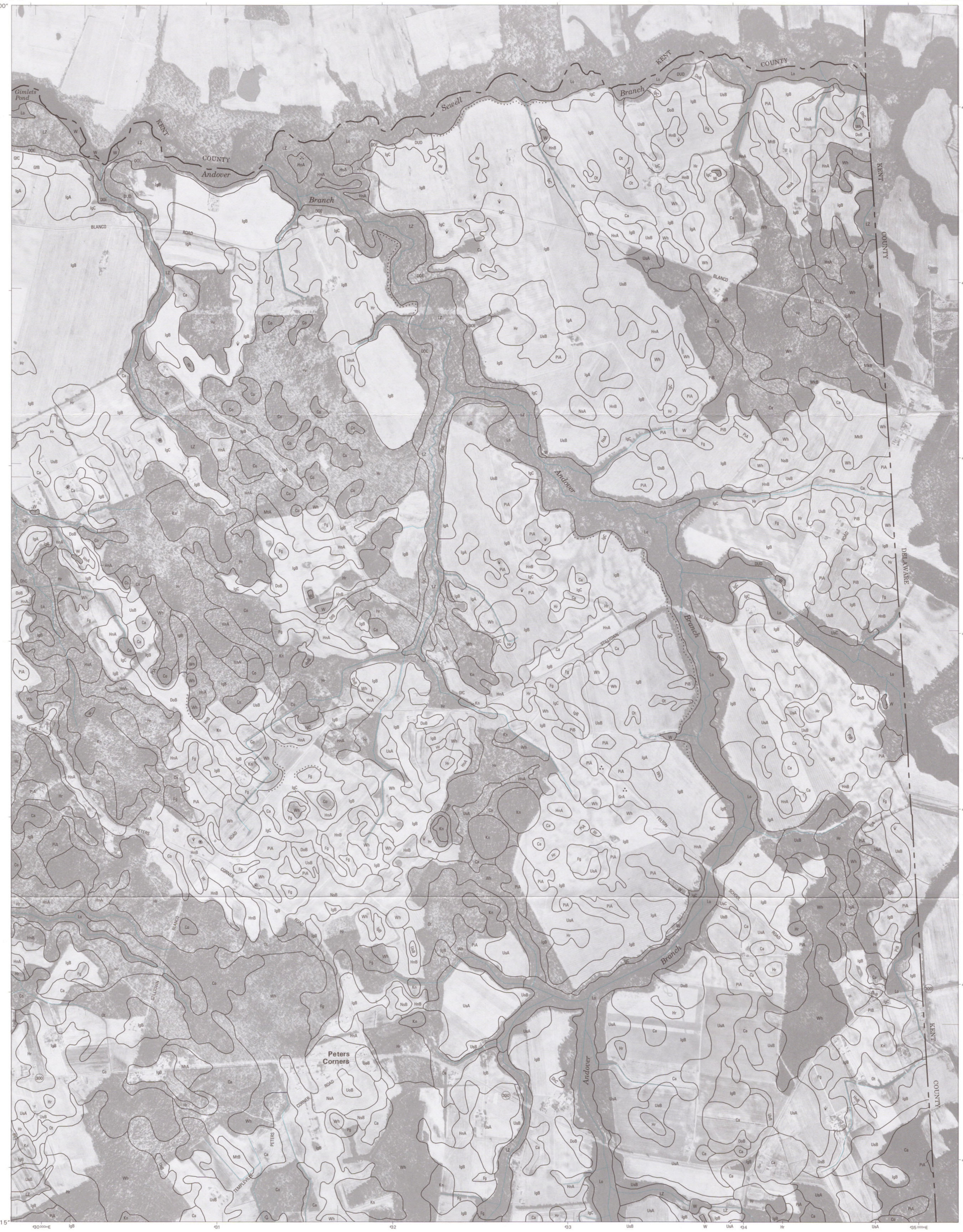
1	2	3
4		5
6	7	8

1 GALENA SE
2 MILLINGTON SW
3 MILLINGTON SE
4 CHURCH HILL NE
5 SUDLERSVILLE NE
6 CHURCH HILL SE
7 SUDLERSVILLE SW
8 SUDLERSVILLE SE

INDEX TO ADJOINING 3.75 MAPS

SUDLERSVILLE NW, MARYLAND

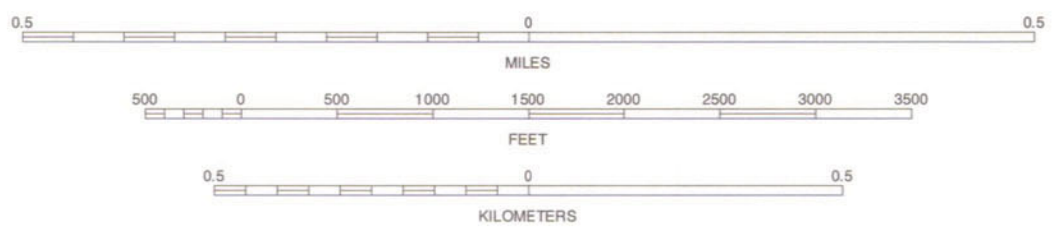
3.75 MINUTE SERIES
SHEET NUMBER 7 OF 47



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

SCALE 1:12000



1	2	3
4		5
6	7	8

1 MILLINGTON SW
2 MILLINGTON SE
3 CLAYTON SW
4 SUDLERSVILLE NW
5 KENTON NW
6 SUDLERSVILLE SW
7 SUDLERSVILLE SE
8 KENTON SW

INDEX TO ADJOINING 3.75 MAPS

SUDLERSVILLE NE, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 8 OF 47

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES: 0.5 — 0 — 0.5

FEET: 500 — 0 — 500 — 1000 — 1500 — 2000 — 2500 — 3000 — 3500

KILOMETERS: 0.5 — 0 — 0.5

1	2	3
4		5
6	7	8

1 ROCK HALL NE
2 CHESTERTOWN NW
3 CHESTERTOWN NE
4 ROCK HALL SE
5 CHESTERTOWN SE
6 LANGFORD CREEK NE
7 CENTREVILLE NW
8 CENTREVILLE NE

INDEX TO ADJOINING 3.75 MAPS

CHESTERTOWN SW, MARYLAND
3.75 MINUTE SERIES
SHEET NUMBER 9 OF 47